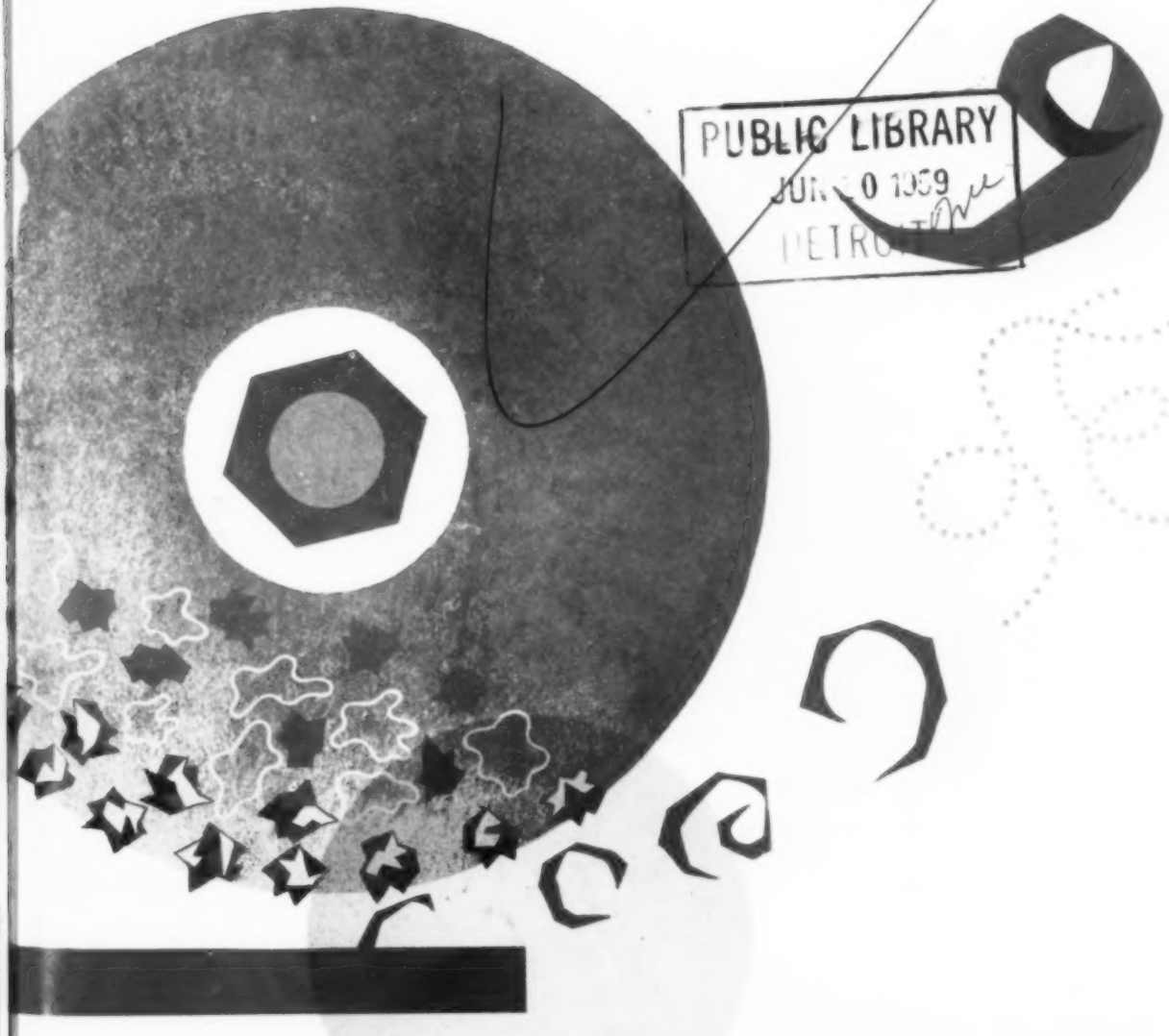
GRINDING and FINISHING

JUNE • 1959

IN THIS ISSUE:

How to Design for Grinding
The Problem: Finish Printed Circuits
5th Industrial Finishing Exposition



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Red Center plastic reducing bushings are specially designed for easy manual insertion and snug fit, which is facilitated by a slight taper on the outside diameter. They fit into a grinding wheel with 1¼" center hole to reduce the hole size to 1", ⅞", ¾", ⅝" or ½". They are removable and can be used on conventional lead or plastic bushed wheels.

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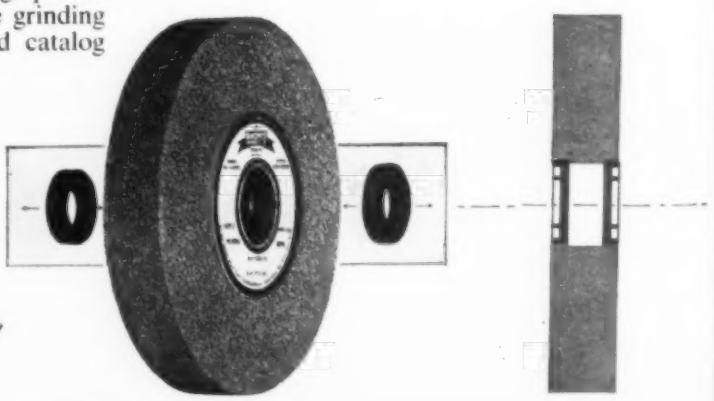

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WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

GRINDING and FINISHING

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JUNE COVER: An artist conception of the action of the grinding wheel graphically introduces the lead story on design for grinding. The action of many sharp points of the abrasive grit in the wheel is the same as a single point tool in producing chips. The many variables involved in grinding make it an extremely universal operation.

NEXT MONTH: In the photo and art work is shown the finishing of stainless steel. This cover will introduce a series on solutions to the problems of stainless steel finishing.

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.
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Phone MOntrose 5-1000. Cable address: HITCHPUB Accepted as controlled circulation publication at Pontiac, Illinois.

Howard Beacham tripled wheel life,

Howard Beacham has been a Bay State Abrasive Engineer for fifteen years and his total experience is double that. He's worked on grinding problems that have involved every type of metal in jobs as tiny as miniature bearings and as big as the world's largest air compressors and steam turbines.

cut dressing frequency in half at New Process Gear

The closer you get to automation, the more it hurts to have production interrupted. That was the principal problem at Chrysler's New Process Gear Division where semi-automatic grinding of flats on truck transmission shafts was halted by wheel dressings every eleven pieces.

The three competitive wheels used in this simultaneous "cam grinding" operation wore down so fast they had to be replaced every week. And, on top of that, an alarming number of shafts were being cracked during the grinding operation.

Bay State's Howard Beacham was called in on the job. He specified a trio of Bay State wheels that produced really spectacular results.

Production jumped to twenty-five perfect shafts per dressing and wheel life went up to three full weeks. Finish was excellent, too.

Why not talk to your own Bay State representative next time you have a grinding problem? Like Howard Beacham he's a trained specialist. *Better grinding at lower cost . . . that is his business.*

Operator Henry Kotas runs grinder equipped with one 24 x 1-21/32 x 12 and two 24 x 1-3/4 x 12 Bay State wheels. The three wheels simultaneously grind flats on main shaft for 5-speed truck transmission.

(*Above*) Manufacturing Engineer Wiley Bell and Plant Superintendent Nelson Fisk examine finished truck transmission shaft.

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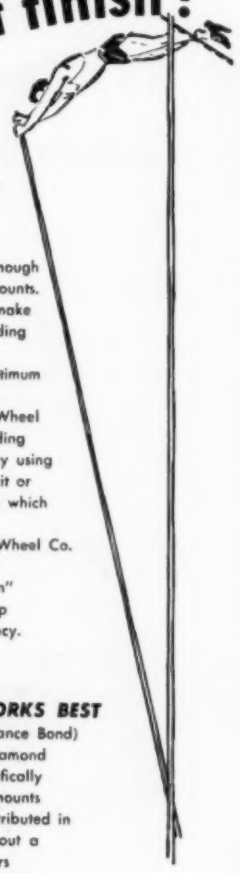

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PRESSURELOK builds optimum performance into every United States Diamond Wheel —yet your carbide grinding costs may be reduced by using a different type, size, grit or hardness of wheel from which you are now using.
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Editor's Mail

From A 1956 Issue

Mr. Harold R. Nissley
Consulting Engineer
Cleveland Heights, Ohio
Dear Harold:

I have just read your article, "What Constitutes a Fair Day's Work?" which appeared in GRINDING and FINISHING of August, 1956. I found the article very interesting and wondered if you had written other articles similar to this. You have been very kind in the past in sending me articles which you have written, and I assure you that I am always interested in what you do.

I hope that I may see you again, soon, probably at the Clinic next fall?

Best personal regards.

R. H. Landes
Assistant Superintendent
Manufacturing Engineering
Western Electric Co.
Chicago, Ill.

This is interesting that such a busy man should be reading GRINDING and FINISHING nearly three years after its publication! (Even I had forgotten I had written the article; and nowhere does it appear in my list of Published Articles).

(Signed) **Harold R. Nissley**

Wet Blasting

I would like very much for you to send me ten copies of the article, "Here's How Wet Blasting Cleans Forging Dies," which appeared on page 47 and page 48 of your March, 1959, issue.

W. J. Walther
Roto-Finish Co.
Kalamazoo, Mich.

Built-in Guard Cup Wheels

Would it be possible to get five copies or tear sheets of the article on pages 40 and 41 of the March 1959 issue of GRINDING and FINISHING magazine? The title of the article is: "The Case for Built-In Guard Cup Wheels."

W. F. Armstrong
Chicago Wheel & Manufacturing Co.
Chicago, Ill.

Remember 1956?

I would like to congratulate you on your excellent editorial in the April issue.

We believe everyone should have the opportunity to read it as it is packed with valuable points.

May we have permission to reproduce this page for distribution to our sales and dealer forces.

O. Mark De Michele
Advertising and
Public Relations
Engelberg, Inc.
Syracuse, New York

Lapping Machine

In your November, 1958, magazine GRINDING and FINISHING the lead feature article was "Crankshaft Grinding at Ford's Lima Engine Plant." In this article is pictured and described an Impco Lapping Machine which uses abrasive belts to polish crankshafts.

Since November we have been trying without success to locate the manufacturer of this machine. If you can give us this information, it will be appreciated.

E. S. Cummings, Jr.
Whitin Machine Works
Charlotte (N.C.) Div.

The name of the manufacturer you requested is: Industrial Metal Products Corp., P.O. Box 156, 3417 W. St. Joseph St., Lansing 1, Mich.

Roll Grinder

On pages 36-39, March, 1959, issue of GRINDING and FINISHING, there is featured a roll grinder as designed by B. S. Roy & Son Co. We have been unsuccessful in obtaining the address of the B. S. Roy & Son Co. and would appreciate your advising this information.

E. L. Cahn, Pres.
Dixie Mill Supply Co., Inc.
New Orleans, La.

The address you request is: B. S. Roy & Co., Worcester 3, Mass.

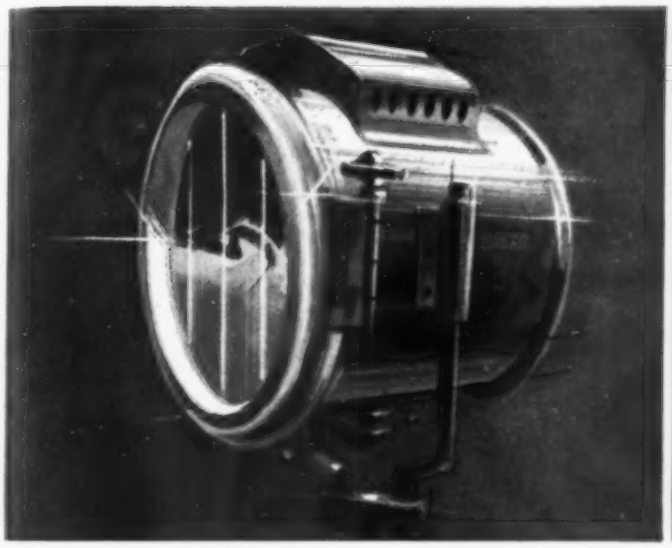
Filtration

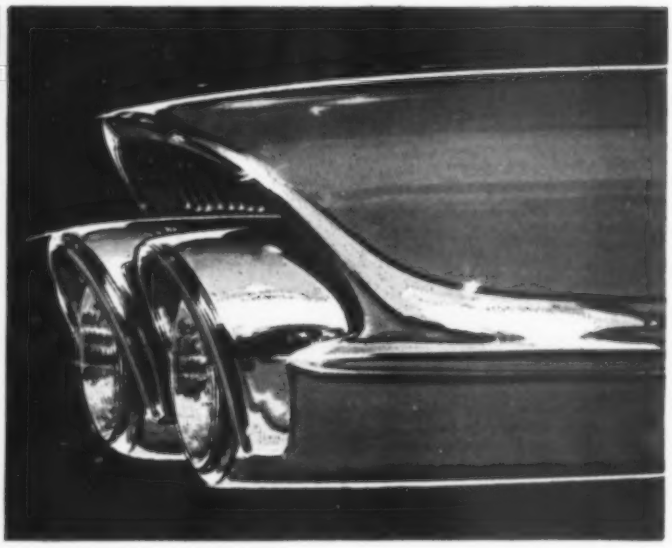
We were delighted to receive the material you sent on filtration. We also appreciated very much having your comments. It is evident that you have done far more than anyone else on this subject.

Alexander Stolley, Vice-Pres.
Farson, Huff & Northlich, Inc.
Cincinnati, Ohio

Half a century apart . . .

both finished by Acme machines!





Even in 1910, part of an owner's pride in his car lay in gleaming brightwork. But polishing and buffing the shiny metal that he loved so well caused manufacturers plenty of headaches. And so they turned to Acme—and Acme has continued to supply the answers to their finishing problems.

Today, Acme engineers combine standard units with a variety of accessories to make custom polishing and buffing machines. Large corporations and small job shops alike use Acme machines to reduce rejects, increase production volume, machine finish odd-shaped pieces.

Every year of its history, Acme has encountered new finishing requirements—each an individual problem—and solved them. Chances are, we can solve your problem, too. Send for illustrated 16-page catalog today.

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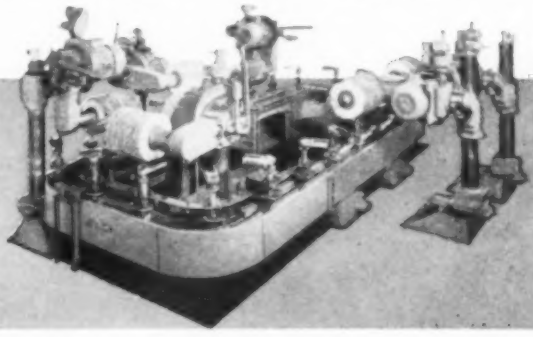

Acme universal automatic polishing and buffing machine with camming and rotating fixture arrangement serving eight Acme adjustable heavy-duty buffing lathes having 24" wide wheels. Automatic wheel wear compensation is featured. Operation is finishing automotive taillight component.

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V-517

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On a Blanchard No. 42-84, each group was finished in 3 hours.

Whatever *your* surface grinding requirements may be, there's a Blanchard designed to give you peak production and economy. Write today for your free copy of "Work Done on the Blanchard", Fifth Edition, and "The Art of Blanchard Surface Grinding", Fourth Edition.

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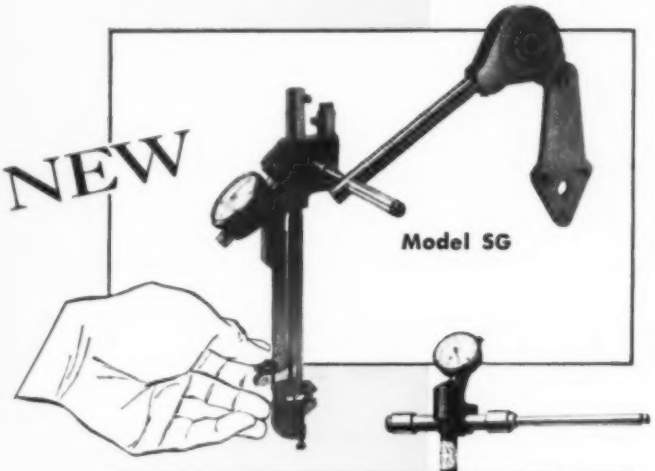
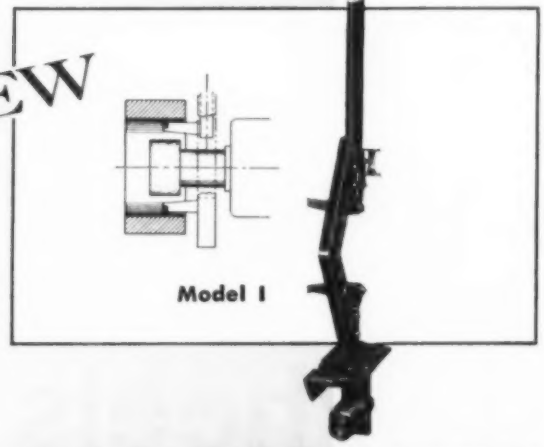


Model SG

NEW



Model I

NEW

Model LG

Here are three new Arnold Grinding Gages. The Miniature (SG) and King Size (LG) Models now permit continuous measurement for O.D.'s from .060" all the way up to more than 30". And, for the first time, there is an Arnold Grinding Gage to continuously measure I.D.'s. These, like all Arnold Gages, eliminate having to "grind and check". Size of part is shown continuously as metal is being removed, so operator always has positive and precise size control without having to stop his machine until the piece is finished. No oversize regrinds . . . no undersize rejects.

FOR SMALL O.D.'s Model SG

Calipers adjustable from .500" to .093"
Special calipers as small as .060"
Easily adapted to automatic size control of small parts
New style supporting hub

FOR I.D.'s Model I

Checks internal diameters continuously *while* grinding
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The results are impressive: from 30% to 50% longer wheel life than was possible with the old natural grit. Why the spread? Because there's no such thing as an average job, so you can't strike an average figure. But whatever the job, this new natural grit is a vast improvement.

Selected Natural Diamond (SND-RESINOID) was researched especially for users of resinoid-bonded wheels. This grit will be available to your wheel manufacturer. Next time you order a resinoid wheel, specify SND-RESINOID. He'll know what you mean.

ON NATURAL DIAMONDS

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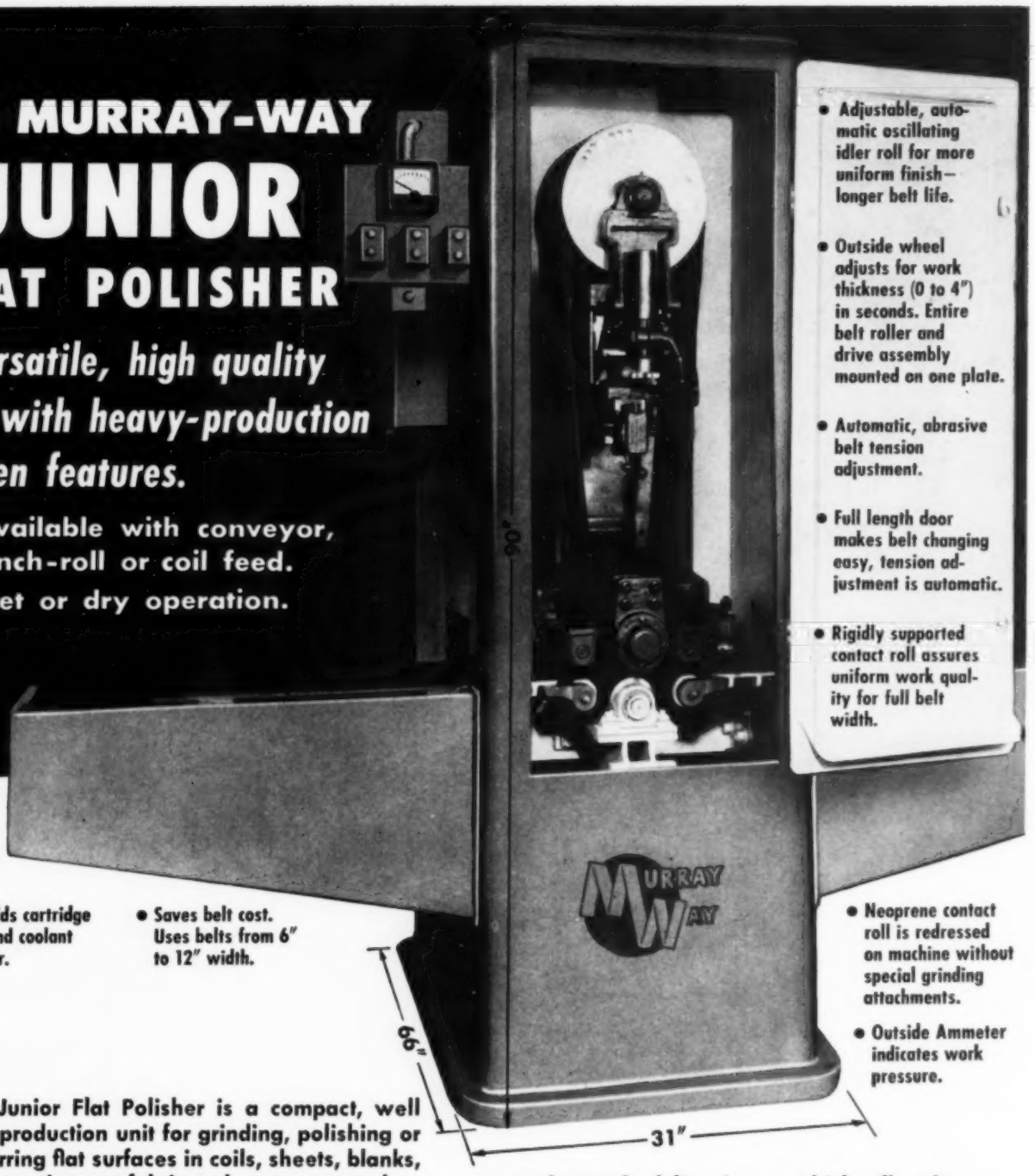

- Adjustable, automatic oscillating idler roll for more uniform finish—longer belt life.
- Outside wheel adjusts for work thickness (0 to 4") in seconds. Entire belt roller and drive assembly mounted on one plate.
- Automatic, abrasive belt tension adjustment.
- Full length door makes belt changing easy, tension adjustment is automatic.
- Rigidly supported contact roll assures uniform work quality for full belt width.
- Base holds cartridge filters and coolant reservoir.
- Saves belt cost. Uses belts from 6" to 12" width.
- Neoprene contact roll is redressed on machine without special grinding attachments.
- Outside Ammeter indicates work pressure.

The Junior Flat Polisher is a compact, well built production unit for grinding, polishing or deburring flat surfaces in coils, sheets, blanks, bars, castings or fabricated parts at very low cost.

It is a standard size machine accepting work up to 12" wide, 4" thick and any length desired. Two or more units may be used in tandem to perform consecutive polishing operations.

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Editor's Page

JUNE 1959

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WHY GRINDING?

How many times have you heard the basic reasons for grinding explained? How many times have you heard or read about the advantages of grinding in comparison with other metal removal operations? In compiling information for articles on these subjects such as the one in this issue entitled, "How to Design for Grinding," we have found the industry sadly lacking in knowledge of this foundation type background.

The basic reasons for grinding and the advantages of grinding should be uppermost in the minds of every individual who recommends or selects methods of metal removal. Armed with this information, industry can make tremendous savings and greatly increase production.

Before selection of the operation the design of the part should be carefully evaluated. Slight changes in the original design of the part, which will not affect the function of the part and may even improve the function, can be extremely profitable by cutting costs and increasing production. For example, castings which in the past have been designed to provide for additional stock in order to mill or plane can now be economically cast to closer dimensions and ground. The results are less costs for the castings, less cost for stock removal, less cost for material handling, elimination of an operation, and increased production. This is just one example. There are many more. In fact grinding (including all abrasive operations) has been successfully applied to almost every type of metal removal and finishing operation. No other method can make that claim.

This lack of basic information is understandable as we have found it difficult to obtain for articles we have run in the past. It should be noted however that the various associations stand ready and able to supply information on the subject. The problem to date has been to find a single reference for the basics and for the actual cases of their application.

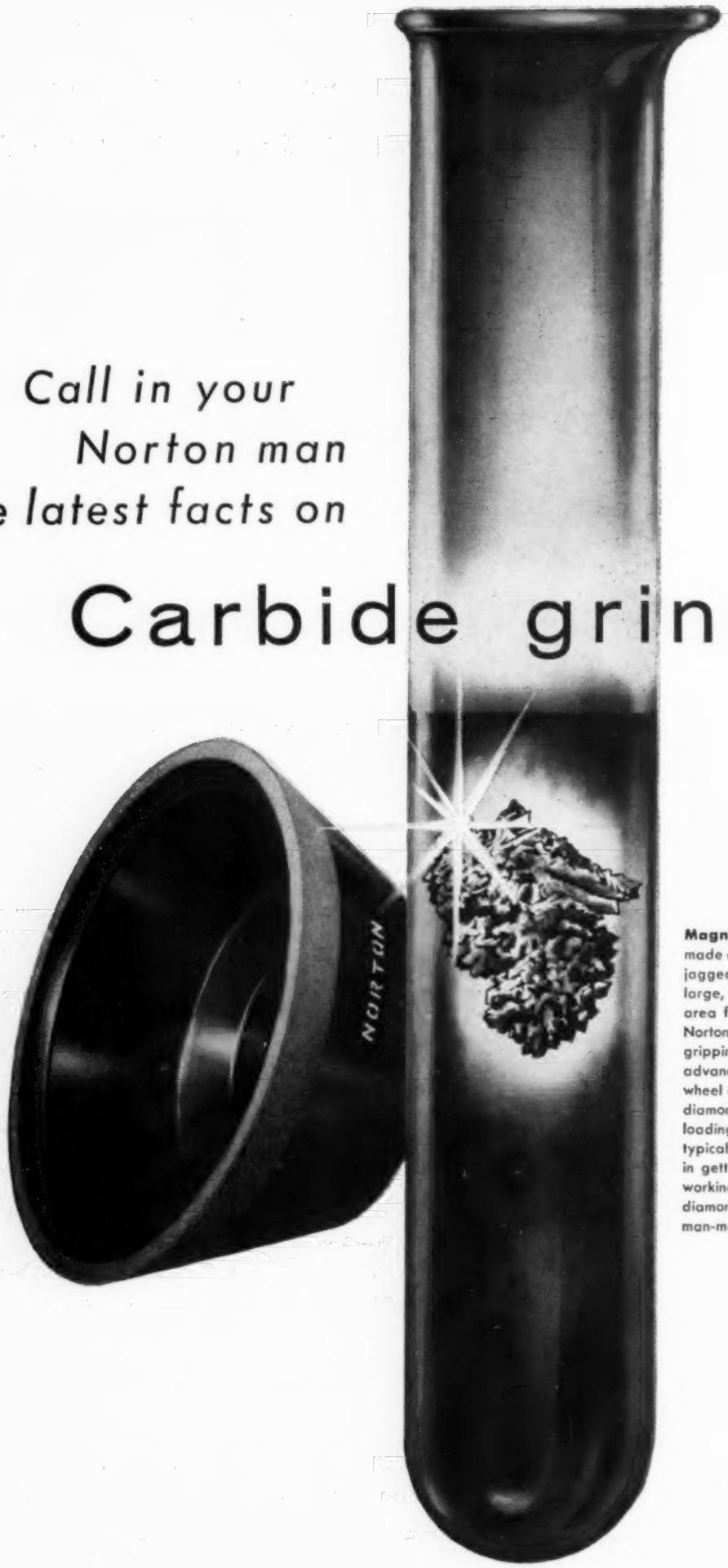
What do we plan to do about it? We plan to greatly increase our efforts to present this information. Specifically, following the article in this issue which will cover the basics and some cases, we will maintain a new department on design for grinding. We invite anyone—user, abrasive manufacturer, or abrasive machine builder to send information and photographs of actual cases where grinding has advantageously replaced another method of machining.

M. M. Patterson

Managing Editor

Call in your
Norton man
for the latest facts on

Carbide grinding



Magnified View of a man-made diamond. The extremely jagged surface provides a large, tight-holding contact area for bonding. In the new Norton SD wheels this extra gripping power, teamed with advancements in diamond wheel construction, reduces diamond loss and carbide loading to a minimum — typical of Norton leadership in getting the maximum working power out of all diamonds, mined or man-made.

with Norton wheels

using mined or man-made diamonds

Norton diamond wheels — the most complete line for carbide grinding — are backed by pioneering never equalled, whether the diamonds used are mined or man-made.

Norton began its leadership in diamond wheel development back in 1930 . . . introduced all three bond types (resinoid, metal and vitrified) of diamond wheels ... does all its own sizing and checking of diamonds... duplicates wheel specifications with constant accuracy.

Today Norton leadership continues with the use of man-made diamonds. Among the newest, most efficient materials produced for industry, man-made diamonds last longer in grinding wheels for many carbide grinding operations because they are more firmly anchored in the bond . . . and because their greater friability presents new cutting edges faster, thereby decreasing power requirements and speeding cutting action.

These properties of man-made diamonds are used to their fullest advantages in the new Norton SD resinoid and vitrified wheels. This has been proved in more than a year of nation-wide, comparative testing . . . *In 63% of hundreds of field tests the average service life of Norton SD diamond wheels was at least 25% longer than the life of wheels using natural, mined diamonds, with no loss in cutting action.*

With each Norton diamond wheel, of mined or man-made diamonds, you get a certificate of the accuracy of diamond concentration. You can depend on this certificate to mean exactly what it says and what you're paying for.

You can depend on your Norton Man, too. This expert Abrasive Engineer has kept close contact with the development of man-made diamonds for grinding applications since the start. He can help you take a giant step forward in your carbide grinding — can show you how to get better grinding quality, longer service life and lower cost grinding for every dollar you spend on diamond wheels. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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Metalworking in General

Operation Button Jar Collects Machines, Tools

Operation Button Jar, an unusual idea to obtain needed equipment for scientific laboratories in universities, gathers discarded material and equipment from industry, reclassifies it, and distributes it to colleges. One of the sources is manufacturing rejects—equipment that cannot be sold commercially because of some limitation, but is still usable. The second source is product samples —equipment used for display purposes, but usable. The third is discarded plant equipment which would be junked, but still good enough for service in the laboratory.

Originally developed by Reese and Miller, Inc., a Cleveland firm that specializes in the preparation of technical literature, the start of the project is being conducted in conjunction with Case Institute of Technology, Cleveland. There will be no charges made to colleges or industries for this service.

GM's Planning Team Helps Reduce Industry Cost

The shop man needs a bridge between what he is doing now and some types of operations research, the Director of General Motors Process Development Section told an aeronautical meeting of the Society of Automotive Engineers. This bridge, Harry D. Hall suggested, is a planning team activity for cost reduction. In GM the team includes engineers from Process Development Staff, a central office organization, and divisional engineers. Problems for such a team, usually four men, may involve an assembly line, the complete processing of a product or simplification of warehouse procedures.

When a study at GM is completed, all information and material is gathered and presented to the plant management, with photos, schematics, special charts and diagrams displayed on the walls of a conference room. The information is reviewed and left with the plant management.

Development of the Corporation the Greatest Invention of All

Development of the modern corporation may "prove to be the greatest invention of them all" when the history of our era is written, remarked Henry B. du Pont, a Vice-President, Director, and member of the Executive Committee of the du Pont Co. of Wilmington, Del. He gave the annual Edward G. Budd Lecture at the Franklin Institute, Philadelphia, on April 15.

The corporation has proved the most effective device for extending technology, taking it out of the sideline class and making it a full-time profession, said du Pont.

In the du Pont Co., for example, "All the facilities which can be mustered are employed to assist the research worker and make his effort more productive," the speaker said. This means not only the best of equipment, but knowledge of what others are doing all over the world and the experience and cooperation of scientists in other fields, he explained. Other companies are also following du Pont's procedure.

A Focus on Optics By Tool Engineers at Seminar

The hocus-pocus of manufacturing magic is rapidly becoming hocus-focus, according to leaders in the optical tooling and gaging industry, who participated in a seminar on this subject held at St. Louis, Mo., May 6, under the sponsorship of the American Society of Tool Engineers.

Working on the theory that light travels in straight lines, this industry has developed tools that measure straightness, flatness, parallelism, angles and dimensions to millionths of an inch in a fraction of the time required by other methods. Claiming that only an

elementary knowledge of geometry is needed to operate these instruments, the industry and ASTE seek to present comprehensive information on this technological advancement which will benefit the entire manufacturing industry.

7 National Scientific Leaders Honored at ASTE Meeting

Seven prominent American leaders in the field of tool and manufacturing engineering were honored at the American Society of Tool Engineers' Honor Awards Banquet, held in conjunction with the Society's 27th annual meeting at Milwaukee, April 18-22.

Those honored were: **George Romney,** American Motors Corp.; **Swan E. Bergstrom,** Cincinnati Milling Machine Co.; **Dr. Mark Ellingson,** Rochester Institute of Technology; **T. Bert Carpenter,** Bert Carpenter Co. (Past-President of ASTE); **Alfred O. Schmidt,** Kearney & Trecker Corp.; **Kenneth J. Trigger,** Professor of Mechanical Engineering, University of Ill., and **Jacob J. Jaeger,** Pratt & Whitney Co.

Int'l Inch Day Does Not Affect Slocomb Micrometers

On July 1, 1959, designated as International Inch Day, the United States standard inch shrinks by two millionths of an inch while the British standard inch grows by a like amount, bringing the two standards together for the first time. The J. T. Slocomb Co. of South Glastonbury, Conn., micrometer manufacturers, report that this measurement change will not affect the use of any of the models in their line of micrometers. Even with the large 60" micrometer, the change in standards means an error of only 1.2 ten-thousandths of an inch, well within the error limit of Federal specifications.

Technical Session Highlights Industrial Diamond Meeting

The Industrial Diamond Assn. of America, Inc. held its 14th Annual Meeting and Convention at the Williamsburg Lodge, Williamsburg, Va., May 11-14. President Morris Winston, of Diamond Drill Carbon Co., New York City, presided at the opening sessions, May 12 and 13. Election of officers and directors took place on May 13, followed by I.D.A.'s first technical session. A fine program of entertainment was also provided for those attending.

21 Engineering Societies Attend ASME Meetings Without Registration Fees

A concrete step toward unity of the engineering profession was disclosed by The American Society of Mechanical Engineers. In the future, members of 21 sister engineering societies will attend general meetings of ASME without registration fee. At conferences sponsored by any of ASME's Professional Divisions, they will pay the same fee as that charged ASME members, usually one half the non-member rate.

The 21 groups are those represented on Engineers Joint Council or Engineers' Council for Professional Development, organizations dealing with matters of profession-wide interest. They are listed as follows:

American Society of Civil Engineers; American Institute of Mining, Metallurgical, and Petroleum Engineers; The American Water Works Association; American Institute of Electrical Engineers; The American Society for Engineering Education; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; The Society of American Military Engineers; American Institute of Chemical Engineers; American Institute of Industrial Engineers, Inc.; The Engineering Institute of Canada; National Council of State Boards of Engineering Examiners; American Society of Agricultural Engineers; American Institute of Plant Engineers; American Institute of Consulting Engineers; Western Society of Engineers; Louisiana Engineering Society; Engineering Societies of New England, Inc.; South Carolina Society of Engineers; Los Angeles Council of Engineering Societies; Kentucky Society of Professional Engineers, and Consulting Engineers Council.

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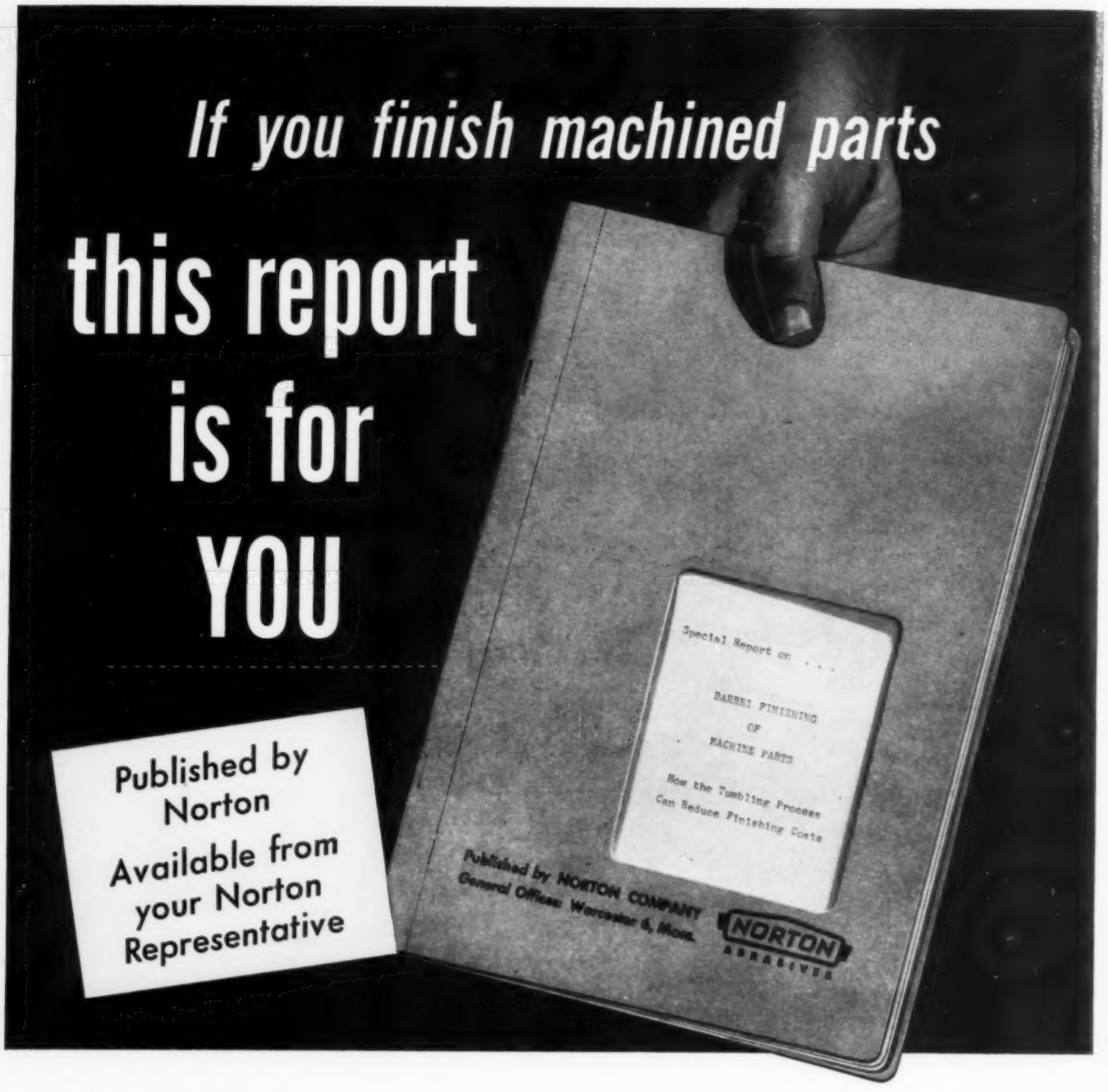
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How the Tumbling Process Can Reduce Finishing Costs
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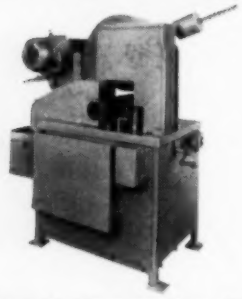
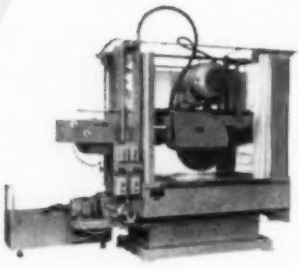
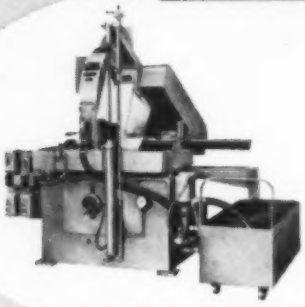


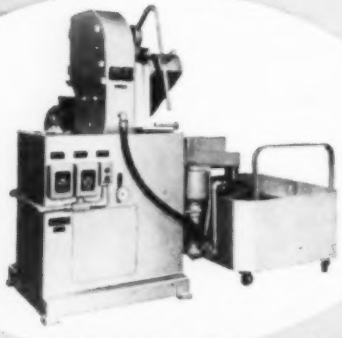
MODEL 28 • Dry cutting chop stroke machine with manual or power oscillation. Capacity to cut ferrous and non-ferrous materials up to 6" angles, 8" channels, and 4" solids. Oscillating action produces burn-free cut on large cross-sections.



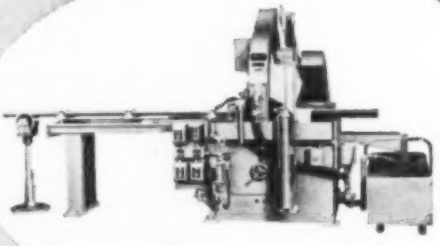
MODEL 342 • Horizontal wet abrasive cutting machine for cutting flat or irregular shapes. Wheel travel up to 42" with adjustable feed rate. Cuts extremely hard materials without burning or checking surface.



MODEL 406 • Oscillating wet abrasive cutting machine for cutting up to 6" solids, or any shape within 6" circle. Power oscillation speeds cutting, maintains low cutting temperature for high quality cuts.



MODEL 223 • Wet cutting chop stroke machine with manual wheel feed, automatic work clamp, work-stop, and coolant flow. Cuts bar stock up to 2" diameter, tubing up to 4" O.D.



MODEL 476 • Fully automatic wet abrasive cutting machine. Stock feed, clamping, wheel feed and return, ejection of cut pieces, adjustment for wheel wear—all performed automatically. Cuts up to 6" diameter solids and tubing, or can be used to cut multiple bars of smaller diameter.

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You Asked . . .

ARTHUR RAKESTRAW
Contributing Editor

Safety—Slots Cut on Internal Grinding Wheel

● On page 49 of the March GRINDING and FINISHING there is a suggestion that slots cut across the face of an internal grinding wheel would improve the cutting action and eliminate overheating. A question has been raised in our shop regarding the safety of this practice.—C. L. Toledo, Ohio.

It is understandable that your safety minded personnel should question this procedure. The wheels could be cracked by the heat produced in slotting. Also, unless the slots were evenly spaced the resultant out-of-balance condition might result in excessive vibration and failure.

The slots might produce a faster rate of cut and might further improve the grinding action by carrying coolant into the cavity of the ground piece but as far as grinding action is concerned the open structure wheels now available would produce practically the same results if finish was not too exacting.

Every shop should carry a range of grits and grades which would allow them to grind all the operations needed. This slotting to obtain a different action of the internal grinding wheel should be used only as a "stop-gap" measure and should be used only with extreme care.

Re-screen Tumbling Media

● How often should tumbling media be re-screened?—P. R. Detroit.

The particle size of tumbling media is selected to meet the requirements of the parts to be finished. When the tumbling media wear to a point that some become lodged in openings or holes in the part the media should be screened to remove the offending sizes.

Control of Noise in Portable Grinding

● Is it possible to subdue the noise in portable grinding?—J. A. P. Philadelphia.

It is possible to reduce the noise in portable grinding if it is considered important enough to warrant the extra time and effort to reinforce the work piece.

For instance, the vibrating part can be dampened by use of suitable pressure jacks. In another case, the annoying vibrations from a brake drum were eliminated by applying a heavy rubber band around the drum periphery.

Large areas of comparatively thin metal which might have a tendency to vibrate during grinding can be either supported by jacks or muffled with asbestos blankets.

In general, however, the extra work required to reduce the objectionable noises would not be considered worth while. Better obtain ear plugs for all personnel in the enclosure, and forget about the noise.

Hard Wheels Burn—Soft Wheels Lose Form

● Cams ground with a resinoid, aluminum oxide, 70 grit, R grade wheel showed a burned surface when they are etched, while hardness drops from about 82 on the scleroscope to about 75. The material is 1055 and 1078 steel. The problem is that these wheels leave a burned surface while softer wheels won't hold the form. What do you recommend?—I. H. Louisville, Ky.

Your problem seems to have a familiar ring as we recall the many problems we have encountered in attempting to establish a suitable cam grinding application.

It is not unusual to find this condition. Grinding speeds are fixed and there is no opportunity to make such changes as would normally be expected to favor the particular grinding wheel specification.

The fact that etched cam surfaces show a burn leads us to believe that the rate of infeed is too great in relation to the cam rotation. An increase in the cam speed during the heavy stock removal should improve the grinding action. A reduction in the rate of infeed would also help. Several complete turns of the shaft are usually enough to produce the desired finish. The grinding wheel should be oscillated both in the roughing and the finishing to facilitate stock removal.

There seems to be a wide difference of opinion among metallurgists regarding cam hardness. Some are unwilling to accept the loss of several hardness points resulting from the drawing operation. Others feel quenching is a must to reduce surface tension and improve

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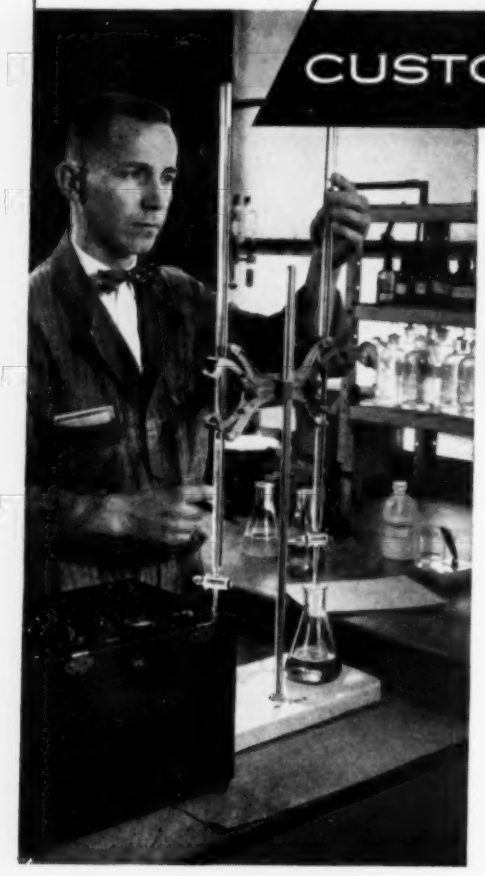

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grinding even though the surface hardness may drop a few points. It may be necessary to review your heat treating procedure.

It would be our suggestion to experiment with the following suggestions. Be sure that the trueing diamond is sharp rather than a rounded point. Try decreasing the rate of infeed, or if possible increase the cam shaft rotation during the rough grinding. Also make sure that an ample supply of coolant reaches the grinding area.

Solid to Segmental Wheel Changes Specs.

● We have been grinding stainless steel on a horizontal spindle surface grinder, using Type 1 vitrified wheels, white aluminum oxide, 46 combination grit, H grade, 8 structure. If we change this operation to a vertical spindle surface grinder using segmental wheels, what changes should be made in the wheel specifications?—A. J. Pittsburgh, Pennsylvania.

In changing from horizontal to vertical surface grinding the grinding wheel contact is increased. In order to compensate it is necessary to select slightly coarser grit one or two grades softer. For stainless steel you might try white aluminum oxide, 30 or 36 grit, F or G grade, 8 structure but remember the selection will depend upon the expanse of the area to be ground, the rim thickness of the segments and the finish required.

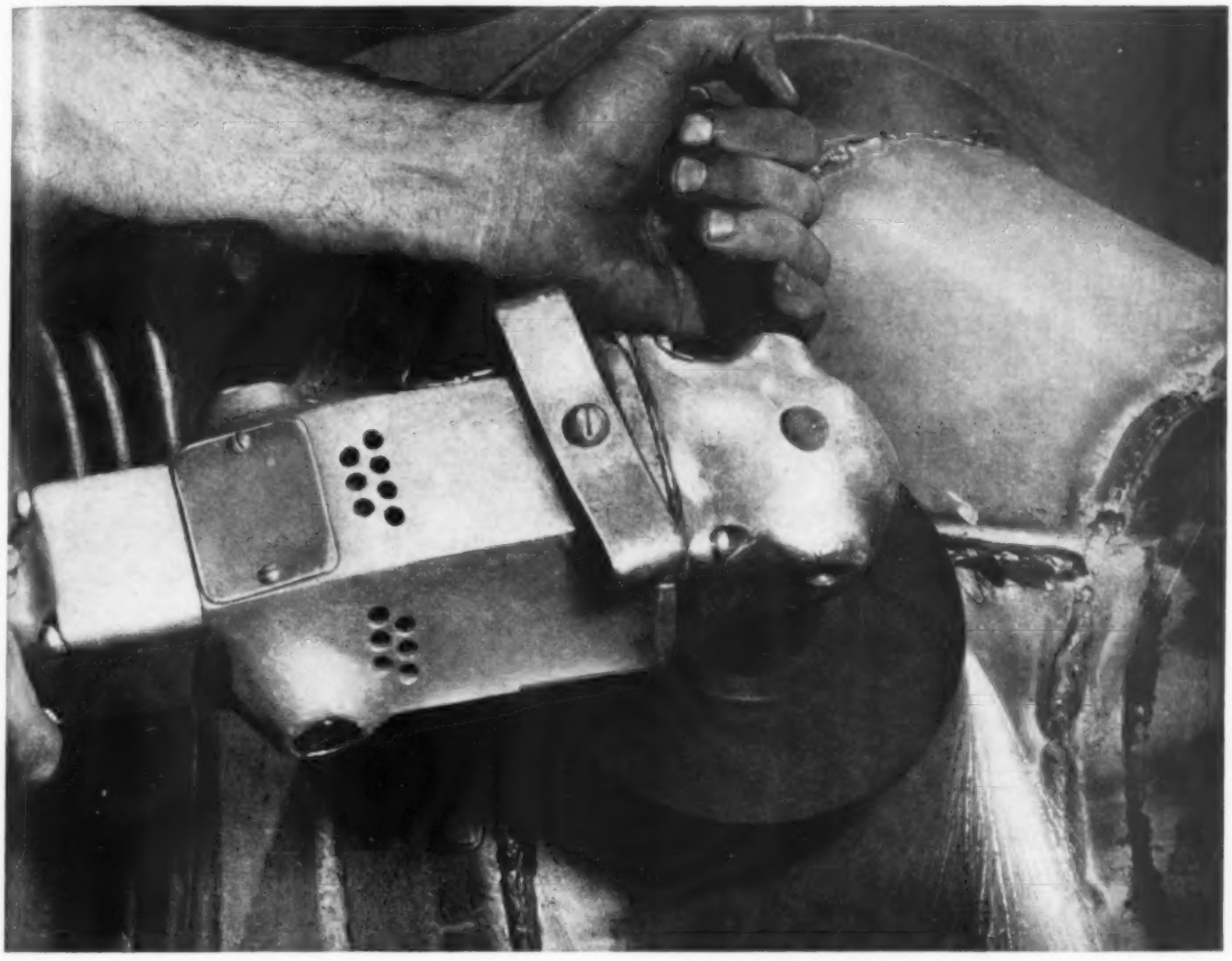
A Reader Comments:

On the question by J. V., Colorado Springs, regarding honing versus grinding I. D., I would say that if this is a production run, the cost per piece would be less by grinding the I. D. I do not know the shape of the part, but it must be possible to chuck it in an internal grinder because of the nature of the question. If the part is ground on the O. D., it is possible to hold the concentricity below .001 without any trouble.

There was no mention of the concentricity required between the O. D. and the I. D. of the part, and that is why I believe it is much faster to grind out .010" to .012" of stock than to hone out .002" on a piece that has a finish bore of 2.625".

WESTERN MACHINE COMPANY
Peter C. Schultz
Foreman—Grinding Dept.

FLEXLITE RAISED HUB GRINDING WHEELS



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RICHARD L. McKEE • Associate Editor

FLANGES: Check and Double Check

● There is one basic reason for using flanges on grinding wheels: they distribute the driving force over a larger area and lessen the strain around the hole. Only safety flanges, designed with prescribed taper and used on wheels with matching taper, are protective devices. The ordinary straight flange is a wheel driver only. All of the precautions listed in the Safety Code are designed to help in doing this job well.

Thus . . .

Flanges must be at least one-third the diameter of the grinding wheel.

They must be finished all over, free of rough or sharp edges, and in good balance (excepting so-called "balancing" flanges which are purposely out of balance).

They must be equal in diameter to avoid cross-bending stresses which could crack the wheel.

They must be recessed so that only the contact area bears on the wheel—and the pressure of the contact area must be uniform.

They must be used with blotters (compressible washers) of at least equal diameter. All wheel manufacturers furnish these blotters.

They must be free of dirt or foreign material—and so must the wheel and the blotters.

The inner or driving flange must be secured to the spindle, and the bearing surface must run true with the spindle.

And they must not be too tight. This is no place for an operator to put on a Charles Atlas act with the spindle nut and a wrench. All that is needed is enough pressure to hold the wheel firmly. Anything over this may spring the flange so that only the inner edge of the contact area is against the blotters, and may crack the wheel into the bargain. And it doesn't help, as some operators think, to hold the pieces of the wheel in case of breakage. It just increases the chances of a break. • • •

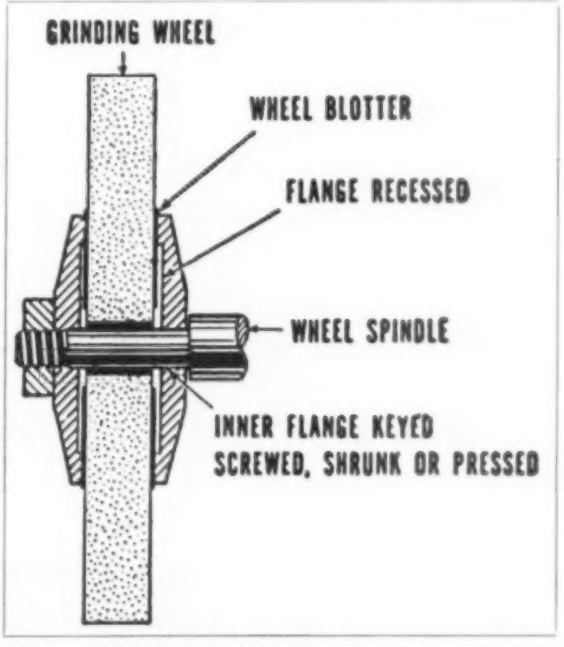
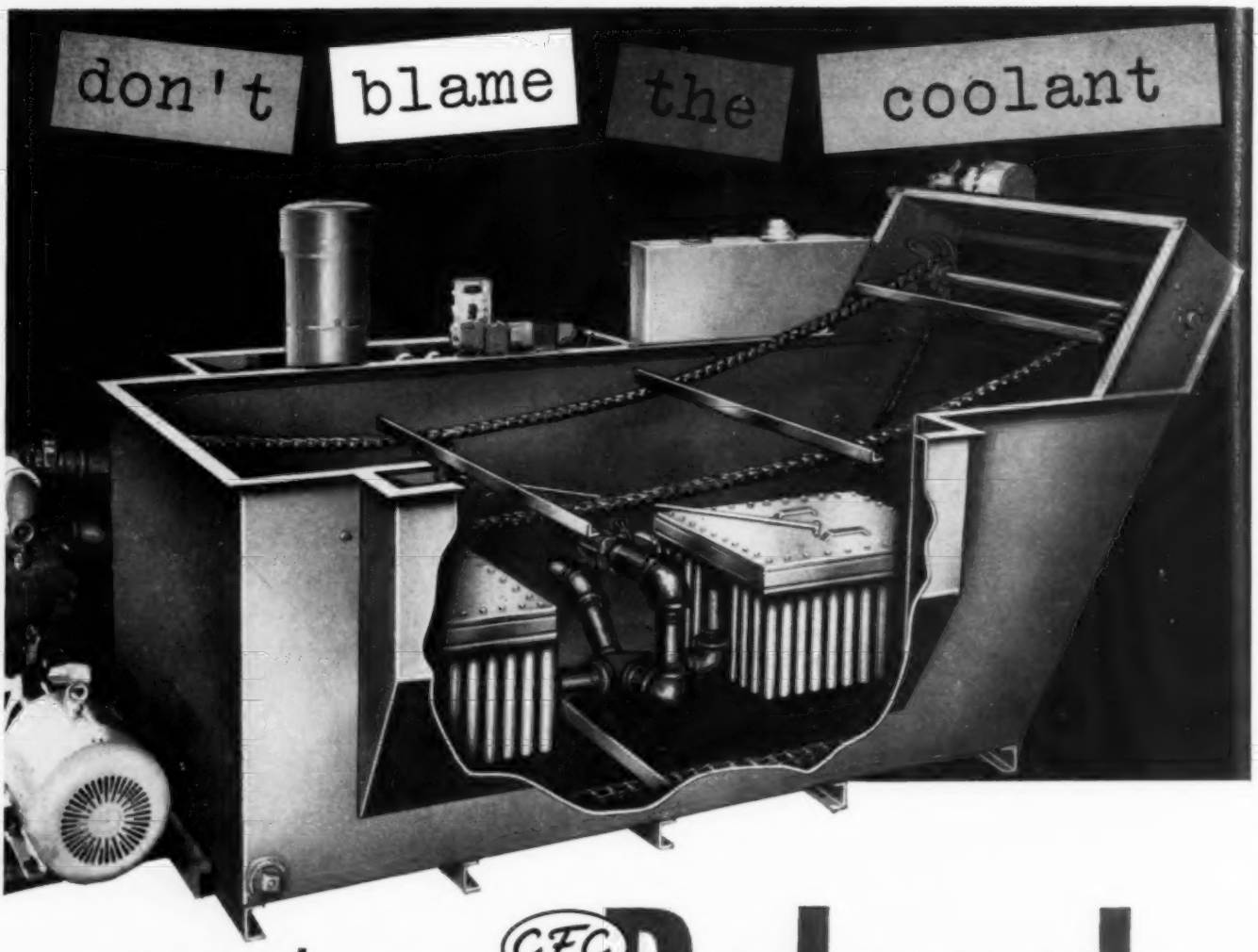


Figure 1. Proper method of mounting a wheel with a small hole. Note the use of wheel blotters and the recessed area in each flange.



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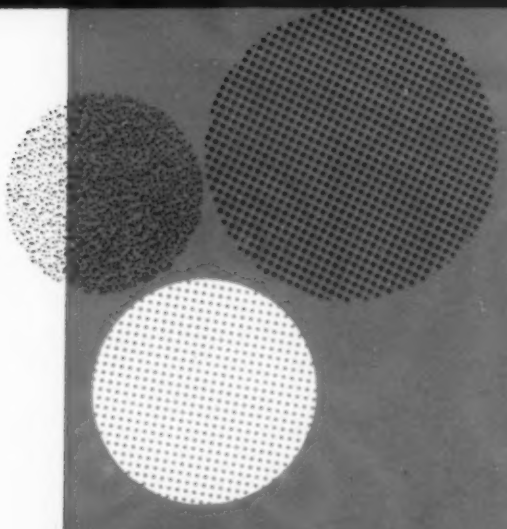
HOW TO DESIGN FOR GRINDING

By *M. M. Patterson*
Managing Editor

Designing of a part should include consideration of the most economical method of manufacture. The versatility of grinding warrants its evaluation as an economical method of stock removal and therefore it should be considered during design of every part.



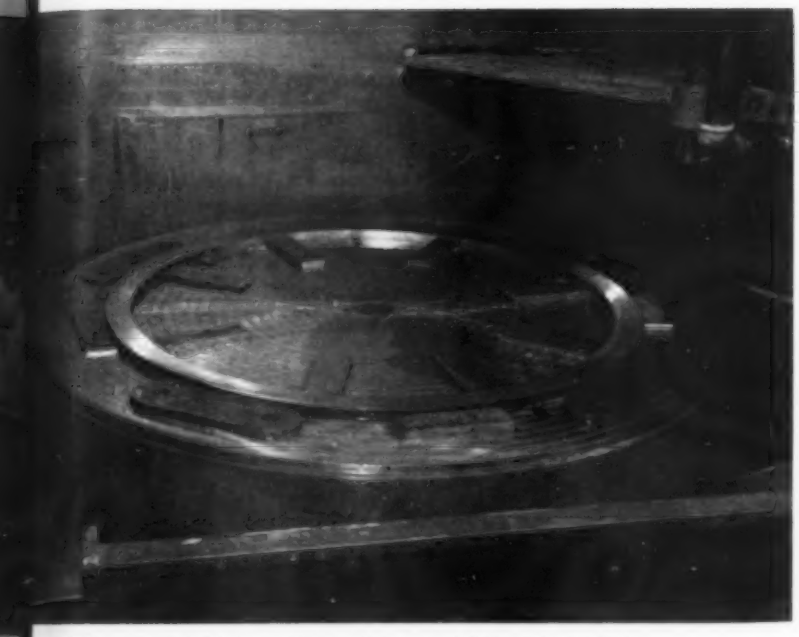


Figure 2. Stainless steel ring on which .070" stock is removed per side. Six sides per hour. Formerly turned at the rate of one and one half per hour. (Above)

Figure 1. Semi-steel meter body on which 1/16" stock is removed and held to .002". Six parts per hour. Formerly planed at 3 parts per hour. (Left)

● Thousands of dollars are being wasted every day by companies performing operations not as economical as grinding. Many people still consider grinding for only finishing operations and do not take full advantage of grinding's ability to remove stock and produce a form. Factors which have been overlooked by those not taking advantage of grinding are: hundreds of pounds of metal are bought only to cost the purchaser again when it is removed; large areas are being machined in order to provide for small areas which are actually needed; two operations are often performed to provide for final size and finish when one would suffice. There are still other factors which will be brought out in detail later.

Grinding has four main fortes. These are: stock removal, accuracy, finish, and producing forms. Every machining operation has as its object one of these points. It can therefore be concluded that a type of grinding should be considered during the evaluation of every machining operation. When designing a part, the following discussion and examples will serve as a guide to the advantages of selecting grinding.

STOCK REMOVAL

Until World War II grinding was looked upon as only a finishing operation. The reasons for this were the lack of knowledge concerning grinding, low horsepower of the equipment, and the relative grades of abrasive products. With the increase in horsepower came a relative increase in abrasive products. The power relationship has increased from 5 hp to 12 hp or more per inch. During this period foundries have also kept pace by developing casting techniques which provide for closer dimensional casting. The combination of greater stock removal by grinding with higher horsepower and closer casting methods has made grinding an economical method of stock removal.

A present day rule of thumb with some exceptions is to grind if the metal to be removed is 1/8 or 3/16. If more metal than this is to be removed, it is generally accomplished more economically by single point machining. The point to remember is that castings have been designed in the past to provide for the stock needed for the single point tool to get below the scale. With the decrease in casting tolerances, grinding can eliminate the cost of buying heavy castings and then paying to remove the excess.

Some materials lend themselves to be economically ground with more than 3/16" stock. Those materials with hard spots (which greatly hamper the use of single point tools) often lend themselves to grinding which has no regard for these variations in the material.

One example of stock removal by grinding is the stainless steel ring shown in Figure 2. These rings were turned, taking one and one-half hours each. Stock removal is .070" per side. The rings are now ground at the rate of six per hour. Note the fixturing on the magnetic chuck by use of scrap metal which represents still another savings.

Another example is shown in Figure 1. These meter bodies were being planed at the rate of three per hour and are now ground at six per hour. Stock removal is 1/16". Tolerance is .002" for flatness.

ACCURACY

The area of accuracy, just as finish, has been accepted as the main advantage for grinding. There are several points which justify review. Accuracy

is more important today than at any time in the past. As the accuracy has increased, so has the need for precision tools. The single point tools can obtain the accuracy in most cases, but from the first cut these tools begin to lose their accuracy. This is not so with abrasives. The abrasive tool is self-dressing and therefore will provide as accurate a cut on the last pass as on the first. In cases where conditions require dressing of the wheel, it can be accomplished by including the dressing in the machine cycle with little loss of time, or it can be performed continuously without loss of time.

Another point to remember is the pressure involved. Grinding is accomplished by an infinitely variable downfeed. Two situations are affected by this feature. One, in the case of a part which has a weak area that would distort when machining, the grinding pressure can be reduced to a point which would not distort the area. Two, the variable pressures allow the operator to "spark out." That is to say, he can take one more pass over the work with little or no pressure on the work. These extra passes can remove as little as millionths of an inch—thus greatly reducing the scrap on the operation. This also means that both the roughing and finishing operations can be performed on the same set-up. The roughing wheel can be used to hog off the stock with heavy pressures and then finish with light pressures or "spark out."

Here again we should remember that on many grinding operations the set-up is not as involved as is required on the single point methods. Honing operations are a good example of this. The honing of a part is based on either the part or the honing tool being floated. Many parts being ground are merely set on a magnetic chuck which has sufficient holding power to control the part while grinding.

Grinding is not affected by the material or the tolerances. It will furnish close tolerances regardless of the material on which the operation is to be performed.

FINISH

Grinding can and does provide almost every type of finish required by present-day standards. In many cases grinding is the only method which will provide the finish required. Lapping, honing and super finishing provide the ultimate in finishing. Coated abrasive operations determine the finish of sheet metal. This finish is graded by the grit and grade of abrasive used in the various passes.

Honing is a good example of the acceptance of

Figure 3. Two different cast iron compressor parts ground from the rough to .001" for flatness and parallelism. Stock removal .077" per side. Formerly 1200 surfaces per 8 hour shift. Now grind 4800 per shift.

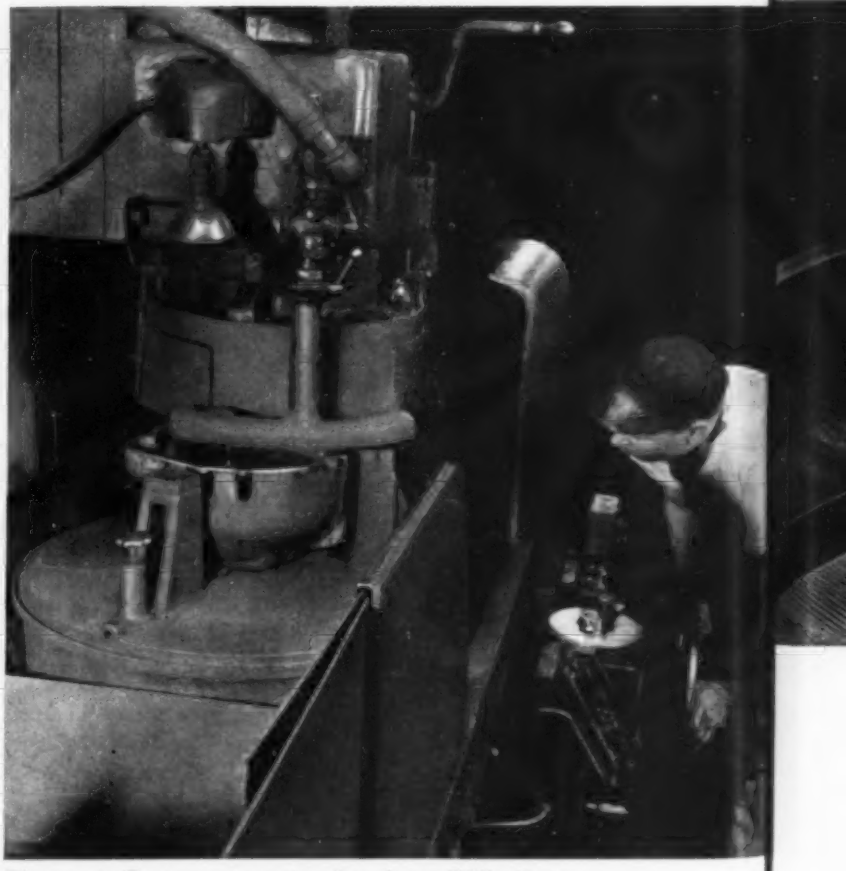


Figure 4. Torque converter housings difficult to mill without springing are ground top and bottom eliminating two milling operations on each surface. Stock removal is .060" to .070" per side to a flatness and parallelism of .0015". Production is 17.4 parts per hour.

finish by abrasives. The automotive industry has for years honed the cylinder walls in order to have a cross hatch pattern which has proved most ideal for oil retention. A word of caution: Do not ask for a better finish than is needed. The automotive industry has done this from time to time on this same honing operation. They can without loss of production or increased costs obtain a better finish on the cylinder walls. However, a better finish on the walls will not allow the pistons a chance to seat themselves in the cylinder. This has resulted in the oil consumption of the engine remaining at a high level during the life of the engine. This is a case where the increase of the quality of the finish actually decreased the quality of the end product.

PRODUCING A FORM

It is difficult to establish bench marks for this phase of grinding as there are too many individual considerations. We can recommend that close search be made of any operation in which the form requires exceedingly high cost tooling. It should also be noted that slight variations can often be made without affecting the operational quality of parts but which will allow for a more economical grinding operation.

Form grinding, either by diamond dressers or crushing, is now a well-established method for machining forms. With few exceptions, many intricate forms can be produced by this method of grinding. After the original set-up the wheel remains sharp and true. Depending on the arrangement, the forming of the wheel can be included in the cycle of the operation or be performed continuously during operation. It should be remembered that very little downtime is required in comparison with other methods which require removal of the tools for sharpening and then resetting.

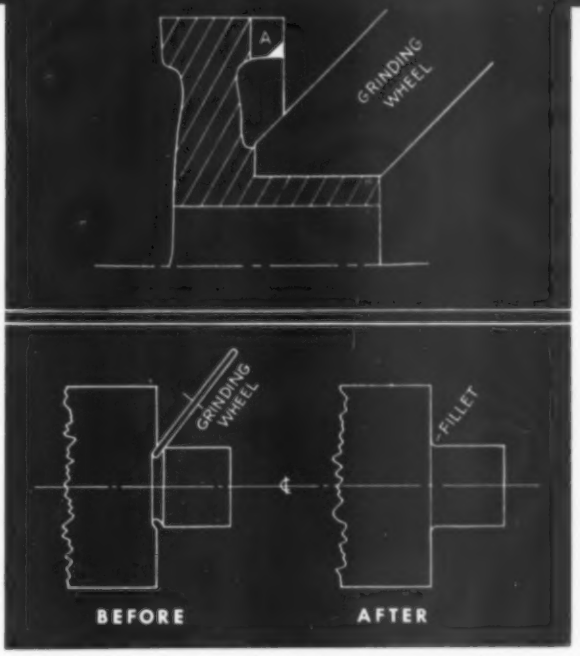


Figure 6. Projecting rim "A" was removed to permit the use of a larger grinding wheel and resultant savings. (Top)
Figure 7. Redesign of the corner in the step on this shaft resulted in a stronger part at much less cost. (Bottom)

Figure 5. Carpenter plane blades on which .012" stock is removed. Setup reduced from 9 hours to ½ hour. Four machines produce 1750 per hour. Formerly used 8 machines.

Changes in design of the part to accommodate grinding, as we have mentioned, can become quite involved. One very important point to remember is that there is no need to design a part with a surface to be machined over the entire side if a smaller area will do. Interruptions which will affect single point machining operations will actually benefit grinding.

Another point to keep in mind is obstructions. Many areas which cannot now be reached by a grinding wheel could be made accessible with minor design changes.

Within the space allotted here we can only touch upon this subject. However, in the months to come, watch for the new department entitled "Design for Grinding." This department will cover many actual cases in which the application of grinding has improved the production of a part. If you are familiar with such a case please write GRINDING and FINISHING. • • •

We wish to acknowledge the help of The Blanchard Machine Co., Mattison Machine Works, and references from the Grinding Wheel Institute's *The Grinding Wheel*.

Figure 8. Crankshaft bearing bracket redesigned to grind all the surfaces in a single pass and surface "B" was leveled out so as not to be an obstruction to the grinding wheel at the end of each pass.

The Problem: Finish Printed Circuits

● Television and radio printed circuits present problems quite a bit different from the printed pages of this publication. The Admiral Corp., one of the first to use printed circuits, has been faced by these problems for some time. Admiral is continually looking for the answers to these problems through increased quality and cost reductions. In one instance this search resulted in the purchase of a flat finishing machine which increased their production and developed a more suitable finish on the copper areas of the printed circuits.

Cost savings alone on the new method are summed up in a statement by Mr. C. S. Rossate, Vice President-Production, ". . . A 70% polishing labor savings. A 50% reduction of polishing material cost. A 90% decrease of rejects caused in polishing."

The printed circuits are made from copper and phenolic laminate. All the punch work has been performed before the material reaches the Admiral Corporation's Harvard, Illinois, plant. The laminates are first screen printed and acid etched. Following these operations the laminates are cleaned of the paint and acid. After cleaning, the parts were formerly hand polished by four operators.

One operator now handles the Hammond FF-8 Single Head Flat Finishing machine. The copper and phenolic laminates are held to .005. The object of this operation is to remove no more than .0002" stock while developing a good finish for soldering and maintaining an even finish over the entire surface. By installing the Hammond Flat Finisher, Admiral has now been able to automate this operation with their other operations having a capacity of 30,000 to 40,000 circuits per week. Since the installation they have had no maintenance except for belt change and cleaning of the machine.

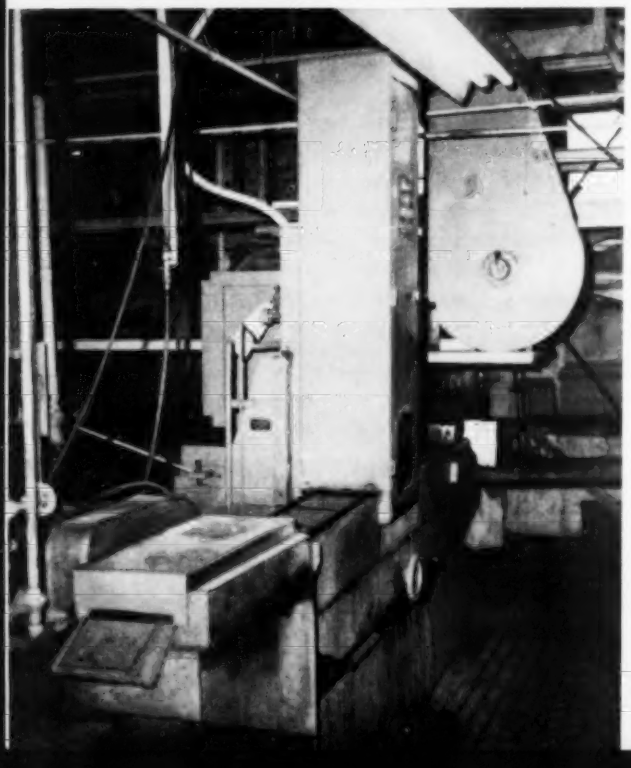
One operator now can remove the laminates from the racks and feed the Hammond FF-8 Single Head Flat Finishing Machine.

The machine uses an 8", 280 grit, silicon carbide belt for polishing. A 120 grit silicon carbide belt conveys the laminates through the machine at a rate of 30 ft. per min. The abrasive belt is used to convey the work because of its ability to hold the part as it passes under the belt and be rigid enough to obtain the accuracy required. A relatively soft contact wheel of 30 durometer with scope serrations is used.

From the flat finisher the boards pass through a dryer designed and built by Admiral to remove moisture on the boards as a result of the coolant used in the finishing operation. The circuits are then printed with component information on the back. This information corresponds with the schematic making it very simple for servicing should the need occur. The boards are then siliconed by selective printing, oven cured and then shipped to Admiral plants all over the world.

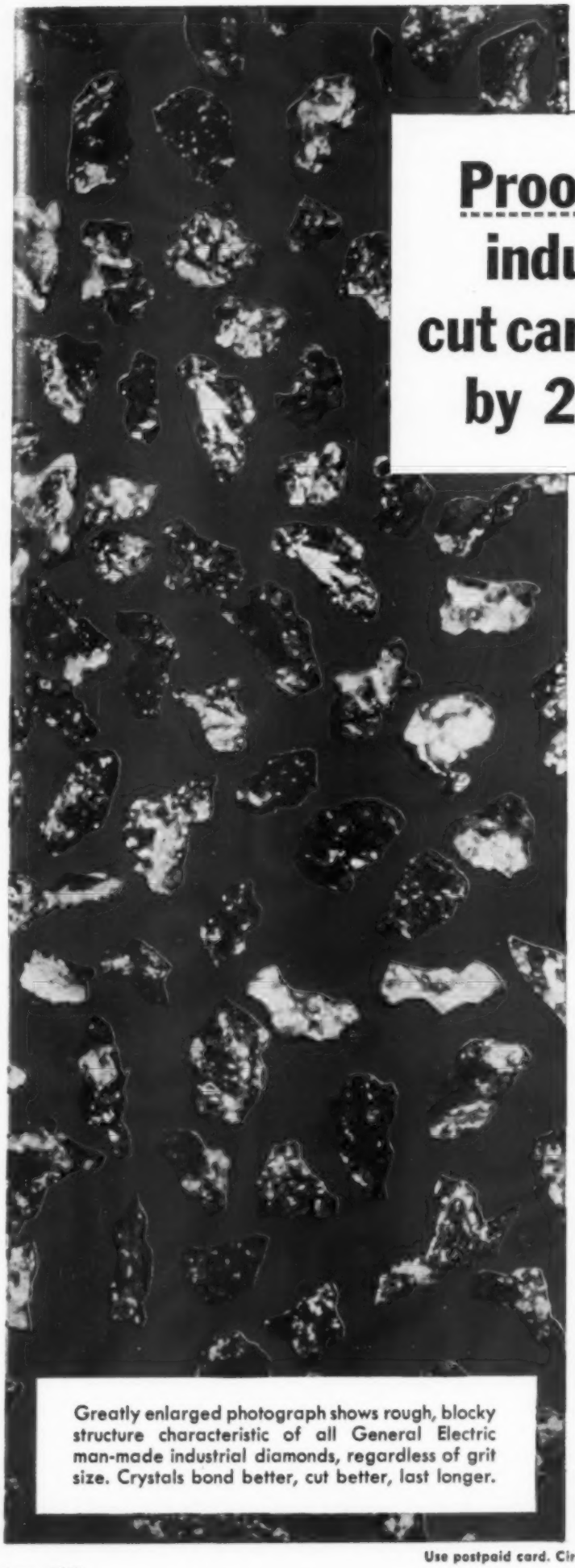
Admiral, by the use of the Hammond Flat Finisher, have eliminated their slowest operation, obtained a serrated finish to which the solder adheres better, achieved more accurate control of requirements and cut costs by labor savings, less material costs and less rejects. • • •

Shown below are the Hammond FF-8 Single Head Flat Finishing Machine and the dryer designed and built by Admiral Corp. to remove the moisture from the circuits as they leave the finishing machine.



Metallurgical Memo from General Electric

Proof! G-E man-made industrial diamonds cut carbide grinding costs by 25%-35% average



Greatly enlarged photograph shows rough, blocky structure characteristic of all General Electric man-made industrial diamonds, regardless of grit size. Crystals bond better, cut better, last longer.

Diamond wheel users report on significant savings in switch from natural to man-made diamond wheels Here are some examples:

Automotive Manufacturer, cutter grinding: 5" x 1¾" x 1¼" flaring cup wheels, resinoid bond, 100 concentration, 100 grit—dry grinding. Man-made diamond wheel produced 1217 cutters and still had one-third of the wheel left. Natural diamond wheel produced only 696 cutters per wheel.

Power Tool Company, carbide burr grinding: 6" x ⅛" x 1¼" straight wheels, resinoid bond, 100 concentration, 180 grit—dry grinding. Wheel life with G-E man-made diamonds was 48 hours, while that of the natural diamond wheel was only 34 hours.

Saw Manufacturer, sharpening carbide knives and saws: 3¾" x 1½" x 1¼" flaring cup wheels, resinoid bond, 100 concentration, 120 grit—wet grinding with Cincinnati tool and cutter grinder. Man-made diamond wheel removed 70% more carbide with 57% less wheel wear.

Laminated Die Manufacturer, internal grinding of carbide dies: 1½" x ¼" x ¼" straight wheels, resinoid bond, 100 concentration, 320 grit. Wheel with General Electric man-made diamonds cut faster with longer life than natural diamond wheel.

General Electric man-made industrial diamonds can make savings like those above possible in *your* plant. Specify them from your wheel manufacturers. *Metallurgical Products Department of General Electric Company, 11177 E. 8 Mile Ave., Detroit 32, Michigan.*

METALLURGICAL PRODUCTS DEPARTMENT

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5th INDUSTRIAL FINISHING EXPOSITION

JUNE 15-19, 1959 • DETROIT, MICHIGAN

The American Electroplaters' Society will sponsor the 5th Industrial Finishing Exposition at the Detroit Artillery Armory on June 15 to 19. Internationally known finishing experts will present papers on all types of finishing developments and problems. Over 150 companies will display the latest in finishing equipment and supplies.

• On June 15th the American Electroplaters' Society will sponsor the 5th Industrial Finishing Exposition at the Detroit Artillery Armory. During the five days which this show will be open, over 150 companies will exhibit their latest developments in finishing and allied equipment and supplies. Experts in the finishing field from eight foreign countries as well as the United States will present approximately 60 speeches on related subjects. This Golden Jubilee Convention and exposition promises to be the biggest and best in the history of the society.

Hundreds of products will be on display. In general those of interest to the readers of GRINDING and FINISHING will be: abrasives, barrel finishing and tumbling equipment, buffing and polishing compositions and equipment, and grinding supplies and equipment. The exhibitors, their booth numbers and the equipment they will display, and the booth personnel are listed in this article for your convenience.

Two plant visits are planned. On June 16th at 9:30 a.m. a tour of the Ford Rotunda, a Ford assembly line and steel mill will start from the Statler-Hilton Hotel. Arrangements have also been made to tour the General Motors Technical Center. This trip will also start from the Statler-Hilton. The trip is planned for June 18th at 9:00 a.m. Both dates are tentative.

Two exhibitors will conduct open house at their plants during the exhibition. Murray Way Corp. and Acme Manufacturing Co. will provide transportation between their plants and the Detroit Artillery Armory. Both will have many large machines on display at their plants, some of which will be in actual operation. Acme Manufacturing Co. will be celebrating their fiftieth anniversary, as will the Electroplaters' Society.

While the Exhibition hours run from 10 a.m. to 9 p.m. on Tuesday and Wednesday and 10 a.m. to 4 p.m. on Thursday and 10 a.m. to 6 p.m. on Friday, the meetings will start on Sunday at 9 a.m. These meetings and speeches will continue through Friday at 2:30 p.m. The ladies will be entertained at teas and various other functions during the week.

This show should prove to be one of those rare weeks when the largest possible number of finishing experts will be under one roof. It should prove to be an excellent time to have the many finishing problems answered.

If we can be of any service during your visit to the exhibition, please feel free to stop at our booths 92C and 93C. We will be happy to do what we can to answer any problem or direct you to those who can best answer a particular question. We will also look forward to meeting you and discussing any phase of GRINDING AND FINISHING you may wish to question.

Acme Manufacturing Company **270A, 271B, 272A**

A new low-cost, compact Acme Model KP flat stock grinding and polishing machine is featured by Acme Manufacturing Company in Booths 270A, 271B and 272A.

In addition, three other models of Acme semi-automatic polishing and buffing machines will be shown at the booth. These machines will be performing polishing and buffing operations on a wide variety of die castings, stampings and moldings.

This pioneer Detroit manufacturer of polishing and buffing machines is celebrating, along with the American Electroplaters Society, its fiftieth anniversary this year. To highlight this event during the Exposition, Acme plans an extensive Open House program, and will have on display in their Detroit plants an extensive operating display of modern finishing machines representing a total of approximately $300,000 worth of equipment. Special buses will transport visitors and guests the five-mile distance between the Armory and the Acme plants.

In attendance will be sales engineers **Robert Wesler, William Lumsden, Harold Lane** and **Kenneth Johnson.**

Allied Industrial Products **62C**

Allied Industrial Products, Inc., will be exhibiting in Booth 62C the Ajax bias buff line, notably the "Challenger" buff incorporating a patented pleat.

In attendance will be **E. M. Averkamp**, secretary; **B. D. Miller**, production manager; **Larry M. Lambert**, sales manager; and **I. E. Olson** and **C. A. Murphy.**

American Air Filter Company, Inc. **129, 130**

A Type M Cycoil mist and vapor collector is on display in Booths 129 and 130 by American Air Filter Company, Inc. This new product is reported to be very successful in the collection of acid mist and vapors.

In attendance will be **J. G. Liskow**, sales manager and **J. M. Munson**, supervising engineer, as well as **Earl Graham, Fred Fischer, Jr.** and **Ivan Dyer.**

American Buff Company **1 thru 6**

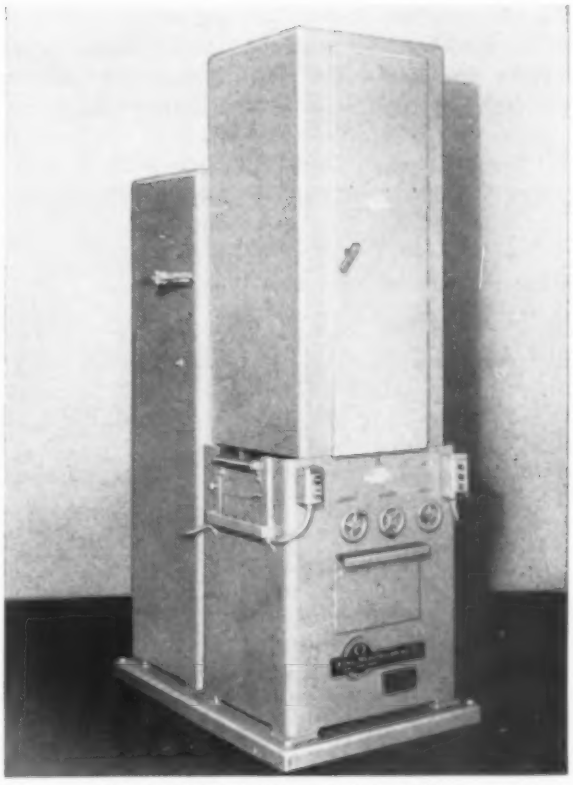
Polishing wheels, sisal buffs of all types and cotton buffs of all types, including ventilated pucker buffs and unit buffs, will be featured in the American Buff Company exhibit in Booths 1 thru 6.

In attendance will be **Ben P. Sax, Stan Sax, Jim Bacha, Glen Beckwith, Rudy Cernick, Harry Pink, Bob Hulland, Ed Hoyle, Murray Paley** and **Morrie Tychman.**

Bias Buff Division **112**
Riegel Textile Corporation

A new fire retardant bias buff is a highlight of the Bias Buff Division, Riegel Textile Corporation, in Booth 112. Various other types of buffs are being shown in addition, and there will also be an action demonstration of the effects of buffing on some of Riegel's buffing wheels.

Tested for six months in industry, the new buff is said to be excellent for high speed automatic machines, to cut faster with less pressure and to give more wear with the hazards and losses caused by buff burning. No fires were reported as occurring during the test period. The buff is available with either permanent or removable metal centers with apertures through which air currents flow.



The new Model KP-8" flat stock finishing machine on exhibit in Booths 270A, 271B, and 272A. (Acme Manufacturing Company.)

In attendance will be **B. R. Boyd** of Detroit, **A. L. Shuford, Jr., W. J. Miller** and **W. K. Reeves.**

Bison Corporation **246A, 246B**

A complete display of buffing wheels, including sisal and sisal and cloth buffs of every type, will be made by Bison Corporation in Booths 246A and 246B.

In attendance will be **N. K. Morelli**, president; **Wm. K. Henry**, vice president; **Gene G. Huth**, factory and equipment manager; and **Ralph Coy** and **Matt R. Hackman**, sales representatives.

Bruce Products Corporation **155A, 156B**

A variety of specialized industrial compounds, including bar and liquid buffing compositions, grinding coolants, non-rust oils, metal cleaners, machining oils, mold release agents and related materials, will be displayed by Bruce Products Corporation in Booths 155A and 156B.

In attendance will be **C. I. Renwick, S. H. Bruce, J. R. Guinter, E. M. Murley, G. P. Hogg, E. A. Ulbrich** and **V. F. Lenzen.**

The Carborundum Company **161B, 162B**
Electro Minerals Division

The introduction of a new "Carbotrol 7" method—a controlled system of barrel finishing—will highlight the display of the Carborundum Company's Electro Minerals Division in Booths 161B and 162B.

On exhibit in the demonstration-type booth will be a complete line of barrel finishing machines and

equipment, barrel finishing compounds and media. The machines, equipment and compounds are new items. Previously, the company had marketed only abrasive media. Two machines, a floor model and a table-top model, will be shown.

In attendance will be **G. R. Rayner, Jr., D. N. Rodger, N. L. Watkins, R. W. Fitch, R. A. Murphy, E. J. Schultz** and **J. S. DeMaio.**

Casalbi Company, Globe Division **17**

Casalbi Company's Globe Division exhibit in Booth 17 will feature a new small size horizontal barrel machine, Model 2200-H. Also included in the display will be sample parts which are being finished by barrel finishing processes.

In attendance will be **William B. Sparks,** vice president; **Carter W. Sparks,** vice president and **Del Dyer.**

Clifford-Rockwell Company **212B, 213B**

Clifford-Rockwell Company of Detroit will have in Booth 213B an exhibit of such organic materials as crushed black walnut shells, corncobs, wood flour and leather fibers for blasting, tumbling, burnishing and drying, products of Composition Materials, Inc., together with a sampling of industrial brushes from Newark Brush Company.

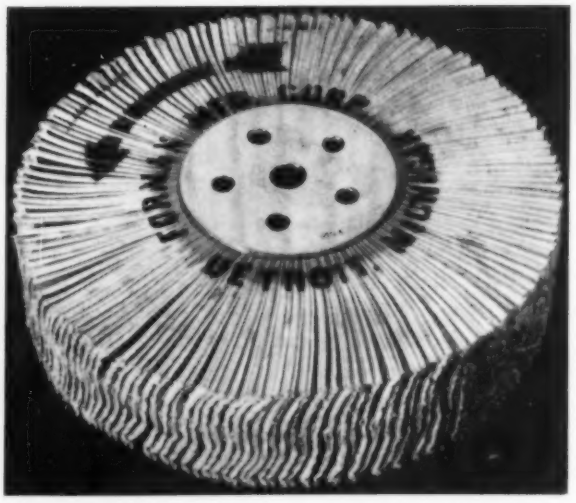
In Booth 212B will be a showing of Hermes coated abrasives of all types—belts, sheets, rolls and discs.

In attendance will be **Dean Rockwell,** president, **Norman Hill** and **Clinton Brisendine.**

Deering, Milliken & Co., Inc. **12**

Deering, Milliken & Co., Inc., will demonstrate in Booth 12 just how its trademarked buff cloth is made. The company will operate a standard loom using skilled weavers who together with buff cloth technical engineers will answer questions relating to this important phase of the metalworking field.

Model J-21-4 Indexing Rotary Automatic with two brushing heads. (Hammond Machinery Builders)



New buffing wheel of flap-type construction. (Formax Manufacturing Corp.)

Formax Manufacturing Corporation **231 thru 234**

The introduction of a radically new flap-type buffing wheel will be the high point of the Formax Manufacturing Corp. exhibit in Booths 231 thru 234, though a complete range of buffing wheels and compounds, together with allied finishing materials, will be on display.

The wheels are currently available in all cloth or in cloth and sisal constructions, and in diameters from 14" thru 22" and in face widths from 2" thru 6".

In attendance will be **H. J. McAleer, E. W. McAleer, E. D. McAleer, J. J. McAleer, Richard McAleer, S. W. Rodger, C. T. Rodger, Jim Belanger, Jim Follas, Bernard Jeske, Bob Blake, Nathan McCune, Dexter Watson** and **Loyal Malone.**

Grav-i-Flo Corporation **143 thru 146**

The Grav-i-Flo Corporation exhibit in Booths 143 thru 146 will include a Spin-Finish machine in operation, a Model BT32-30-2 tumbling machine and a two deck mechanical parts separator. Mechanically finished parts will also be on display.

In attendance will be **R. L. Davidson, L. R. Davidson, Earle R. Bogema, Eugene Jarvis** and **Maurice Condon.**

Hammond Machinery Builders, Inc. **261 thru 266**

A variety of machines for buffing and polishing, flat finishing, and dust collection will be on display in the exhibit of Hammond Machinery Builders, Inc., Booths 261-266.

In addition to the rotary automatic which is illustrated, the company is showing a Model DK-1055 Cyclone Duskolector and a Model FF-12-2 flat finishing machine. Other equipment will include a 14' Horizontal Return Strait Line Automatic showing different methods of fixturing parts for polishing, buffing and deburring, and a two-spindle variable speed polishing and buffing lathe with a semi-automatic gear deburring unit.

In attendance will be **R. M. Bell,** technical manager; **S. H. Miller,** sales manager; and **William Gleason** and **D. A. Kilb,** sales representatives.

Hanson-VanWinkle-Munning Company 299 thru 314

A large island display of buffing compounds, buffs, polishing wheels, brushes and many other items of interest to the metalfinishing industry will be a feature of the Hanson-Van Winkle-Munning Company display, Booths 299 thru 314, which is expected to be one of the largest in the Exposition.

In attendance will be **Louis M. Hague**, President, **Warren S. Wilkinson**, Executive Vice-President in Charge of Operations, and Vice-Presidents **James A. Badaluco, Charles E. Bagwell, Myron B. Diggin**, and **R. M. Norton.**

Kocour Company 67, 68

A dual display will be set up by Kocour Company in Booths 67 and 68. One part will include a functional metal finishing display of buffing and greaseless compounds, polishing greases, buffs and coated abrasives.

In attendance will be **Cyril Kocour**, president; **Orville Kocour**, sales manager; **Edward F. Jablonski**, advertising manager, **Everett A. Hodges**, laboratory director and **Walter Warner**, sales representative.

The Lea Manufacturing Company 204, 205

Technical information on the latest production-proved products, processes and techniques for buffing, polishing and plating will highlight the market place exhibit planned by The Lea Manufacturing Co. The Lea and Lea-Ronal booths are numbers 204A and 205A.

In attendance will be **Earle W. Couch**, president, **H. L. Kellner, Richard P. Crane, D. F. Mosher, Barnet D. Ostrow, Fred Nobel, Kergan Wells, John Guss, Bob Allan, S. Lewis Doughty, Francis X. Bergin, William G. Millman**, and **Leo J. Bakinow.**

Merit Products, Inc. 173

A new segmented flap-type coated abrasive wheel will be the main item of interest in the Merit Products, Inc. exhibit in Booth 173.

Other variations of the flap-type wheel which will be in the exhibit are the unslashed, or solid cloth, wheel, the slashed type wheel which is particularly adaptable in applications requiring the ability to wipe around contours, and thin wheels which are ideal for getting into narrow radii.

New segmented flap-type coated abrasive wheel, Type "BL". (Merit Products, Inc.)

In attendance will be **A. Block**, general manager, and other company representatives.

Floor mounted buffing head. (Murray-Way Corporation)

Murray-Way Corporation 97 thru 99

Murray-Way Corporation will have a double attraction for Exposition visitors—Booths 97, 98 and 99 on the convention floor and a large display of automatic polishing, buffing, coating and filtering equipment at their Birmingham plant just a few miles away. A scheduled commuter service between the plant and exposition headquarters will be available.

The exposition booth will be posted with many photographs and literature showing the equipment, both standard and special, manufactured by Murray-Way. Equipment will be concentrated in the plant display. On hand at both displays will be personnel to discuss polishing, buffing and coating problems.

In attendance will be **E. E. Murray, G. C. Whiteside, J. Brown, L. C. Billig**, and **R. Zech.**

Oakite Products, Inc. 72C, 73C

A complete line of cleaning and finishing materials will be exhibited by Oakite Products, Inc., at Booths 72C and 73C.

In attendance will be **Martin F. Maher**, metal industries manager, **T. R. Smith, D. X. Clarin, R. J. Crane, D. W. O'Leary, J. G. Hyde, J. E. Sauve, Nick Carter, T. D. Ellsworth, D. W. McComb, V. Heinrich** and **E. S. Bradley.**

Productive Equipment Corporation 85C, 86C

A live demonstration of vibratory finishing will keynote the Productive Equipment Corporation's exhibit in Booths 85C and 86C. Small parts will be finished in a 1 cu. ft. Selectro Vibro-Finisher, while a 10.5 cu. ft. model will also be on display.

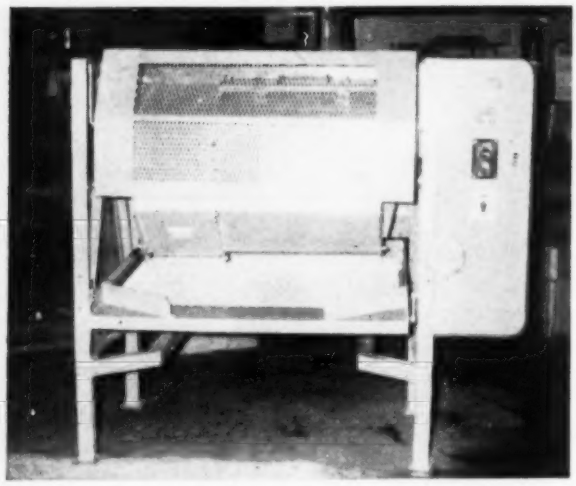
The Selectro Vibro-Finisher is a four-bearing, positive eccentric oil splash lubricated assembly with an

adjustable stroke, equipped with a variable speed drive to operate at speeds from 1200 to 2000 rpm. The hopper has a plasticized liner. All units are equipped with a vented cover and flushing panel. Sizes range from 1 cu. ft. to 20 cu. ft. Screens for separating media from parts, and sectional drums are available as optional equipment.

In attendance will be **G. W. Dwyer,** president, **L. H. Lehman,** vice-president, and **L. M. Haluch.**

Rampe Manufacturing Company **69A**

A tumbling machine in which both tumbling and screening can be accomplished will be the center of attraction in the Rampe Mfg. Co. exhibit in Booth 69A. A number of other tumbling machines will also be on display.



Combination tumbling and screening machine. (Rampe Mfg. Co.)

Sparkler Manufacturing Company **286, 287**

Sparkler Manufacturing Company will be exhibiting filtration equipment engineered for the particular problems of the electroplating industry in Booths 286 and 287.

In attendance will be **W. S. Mullen,** president of Mullen Pump and Supply Co., Detroit, and Michigan representative for Sparkler, and **D. F. Cooper,** manager, Industrial Sales Division.

Techline Division **118C, 119C**
Wheelabrator Corporation

How and where savings can be made in precision finishing costs through use of barrel finishing and wet blasting will be shown in the exhibit of Techline Division of Wheelabrator Corporation in Booths 118C and 119C.

Offering equipment for both processes, the Techline Division will highlight the manner in which these two precision finishing methods often complement each other, as well as the manner in which each can be used alone.

Equipment to be featured in the exhibit includes the Model 30 Techline barrel finishing machine and the Model 43 Liquamatte wet blasting machine.

Model 30 barrel finishing machine. (Techline Division, Wheelabrator Corporation)

The Model 30 series includes 20 sizes ranging in capacity from 5 to 30 cu. ft., and designed with one to six separate compartments. The Model 43, designed for wet blast finishing jobs on small to medium sized pieces, is one of three standard models.

Also included will be a complete display of media, compounds and wet blast abrasives.

In attendance will be **J. A. Schmidt,** general manager; **George H. Lieser,** field sales manager and **Lee D. Stevens,** plant manager.

Wyandotte Chemicals Corporation **157B, 158B, 159A**
J. B. Ford Division

Wyandotte Chemicals' J. B. Ford Division will feature Bufsol, a water-soluble buffing compound remover; Ferlon, an alkaline rust remover; Nordall, a spray cleaner; a number of chemical products for aluminum processing, and a complete line of electro-cleaners in Booths 157B, 158B and 159A.

In attendance will be **P. N. Burkard, E. J. Kubis, T. S. McCormick, R. C. Gertson, E. G. Nutting, R. J. Lang, R. S. Keen, D. Snelgrove, B. Kumko, A. J. Medwedeff, John Harden** and **John Komon.**

Additional Exhibitors

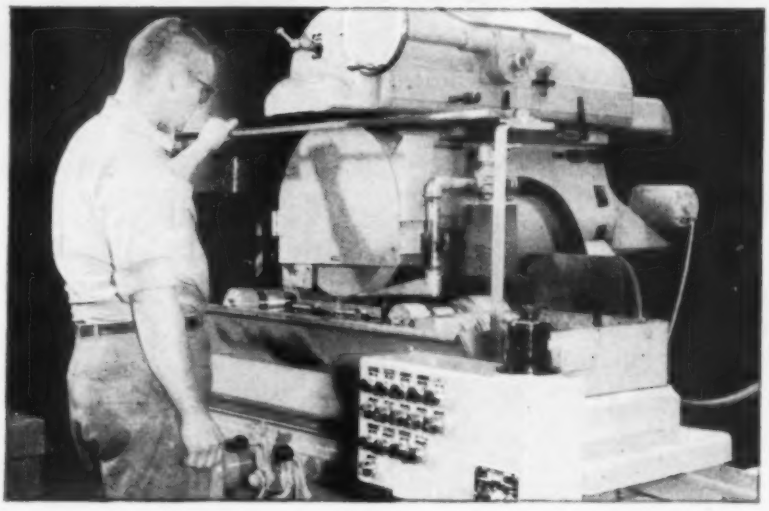
Other companies whose exhibits will be of interest to the readers of GRINDING and FINISHING are:

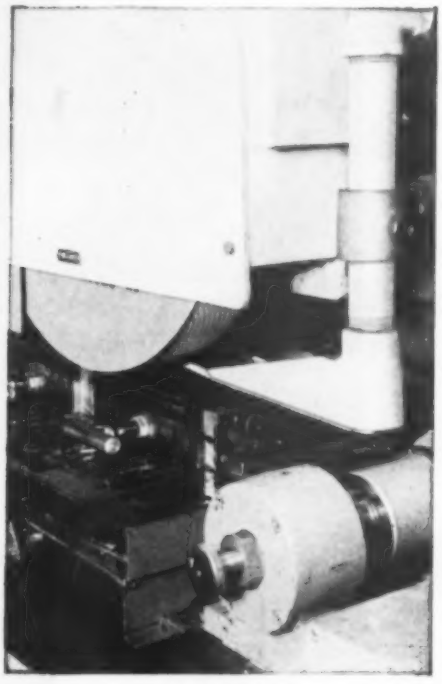
Company Name	Booth Number(s)
Abrado Finish Corporation	34
Baird Machine Company	211
Beacon Supply Company	49
Chicago Rubber Company	18C
F. L. & J. C. Codman Company	20
Lyon, Incorporated	75
McAleer Manufacturing Company	254, 255
Michigan Buff Company	79, 80
Minnesota Mining & Mfg. Company	38, 39
Pressure Blast Mfg. Co., Inc.	53
Promat Division, Poor & Company	160A
Schaffner Manufacturing Corporation	183, 184
Siefen Compounds, Inc.	23
F. B. Stevens Company	191-194
Universal Tumbling Supply Company	46
Wayne Products Corporation	10

• • •

Thompson — TRUFORMING CUTS COSTS 66%

... DOUBLES PRODUCTION AND IMPROVES PRODUCT AT THE OLIVER CORPORATION





In the production of ledger plates, used in the cutter bar of mowing machines, The Oliver Corp. of Chicago, formerly first milled the teeth, then hardened the plate. The hardening process caused distortion and variance in uniformity which impaired the cutting action of the bar.

On the advice of Thompson engineers, a Type BB Truforming Grinder with a 2½" width grinding wheel was installed to process these ledger plates as a finished grinding operation. The plates are now heat treated first and the teeth are then formed by grinding.

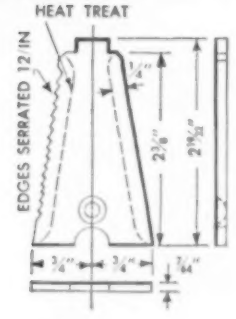
The installation of the Thompson Truforming Grinder has accomplished the following results:

1. **Cut total production costs from $3.18 to $1.06 per 100 pieces.**
2. **Increased the production rate from 1600 to over 3600 pieces per 8-hour shift.**
3. **Provided constant uniformity in the workpieces.**
4. **Eliminated the full-time service of one man.***
5. **A pair of $160.00 milling cutters formerly produced 20,000 pieces. A $60.00 grinding wheel now produces well over 40,000 pieces.**

The leadership of Thompson Truforming Grinders results from 25 years of research and development work in crush form grinding. Today these machines are opening up hundreds of practical, time-saving, profit-improving and cost-cutting applications for industry.

Thompson's engineering experience is available to you without obligation. Write for Catalog T558.

**Automatic machine cycle allows operator time to countersink hole in plate—an operation formerly requiring one man's full time.*



LEDGER PLATE
High Carbon Manganese Steel
Rockwell C52-58

"Keep Thompson in mind for that daily grind"

THE THOMPSON GRINDER CO.
SPRINGFIELD, OHIO

Thompson SURFACE GRINDERS

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Tolerances and Finishes Require Clean Coolant

With every increase in the degree of tolerance or finish there must be an increase in the efficiency of equipment. One of the most important areas is the removal of sludge which will not only decrease the efficiency of the operation but also the equipment.

Close up of an Alsop PAK 6-1 filter being used on an Atrax Automatic Burr Grinder.

● As the tolerances and finishes demanded by our mechanized age become closer and finer, the need for refinement of every phase of the operations is more acute. Raymond F. Harland, General Manager of Alsop Engineering Corporation put it this way, "Industry has learned that longer service life and superior performance of machinery can be had if smaller tolerances are provided. The attainment of smaller tolerances requires that superior finishes be produced. Since such surface finishes are most readily produced by grinding or honing in the presence of a liquid, and since the particles removed from the workpiece, together with abrasive particles from the tool, are carried away from the work area in the coolant, it is necessary to remove the metal particles and the abrasive from the coolant before it is returned to the work area."

The Disc-Pak filter manufactured by Alsop Engineering Corp., Aster Street, Milldale, Ohio, is a filter which has been developed to meet the demands for closer tolerances and finer finishes. This filter, built in 6, 8 and 12 inch diameters, consists of the housing, base and 9 pairs of filter discs for the 6 and 8 sizes, 10 pairs of filter discs for the 12 inch size. The base provides the inlet and the outlet for the coolant as well as the mounting stand. Filter discs are easily mounted on a tube in the filter. The discs are made of selected cellulose and asbestos which have a high moisture absorption capacity. The filter discs are supplied in ten sizes of particle retention. The Sealed Disc Filter is similar to the Disc-Pak except for the discs which are metal encased. This filter is designed for heavy sludge removal or for the recovery of valuable solids such as diamonds.

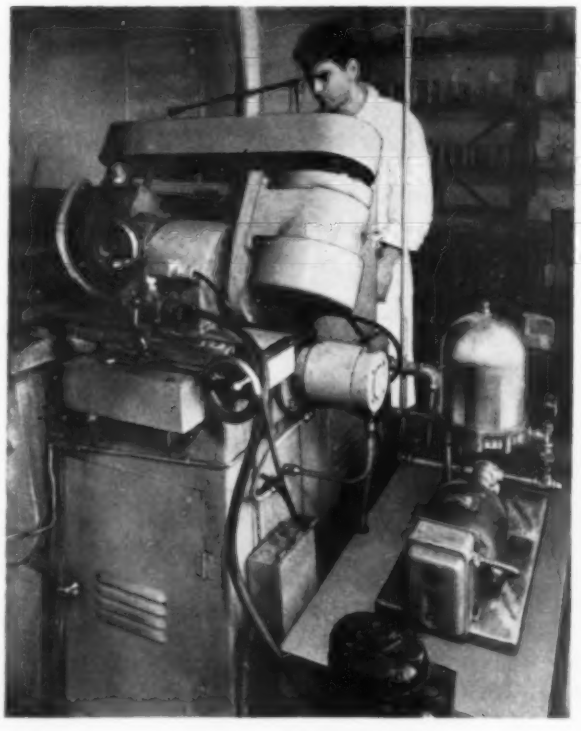
Applications of these filters range from finish grinding high chrome tapered roller bearing races to crush dressed piston pin grinding. The latter case consisted of finish grinding piston pins for automotive engines. Stock removal from the 0.871" dia. x 3.25" long pin is 0.0005". The production rate is 2400 pieces per hour and water soluble coolant is being used. Wheels are both diamond dressed and crush dressed. The surface finish required is a maximum of 3.5 microinches. The use of a filter has eliminated all random scratches.

Another impressive case is the grinding of the races of miniature ball bearing external rings. The problem was that small metal and abrasive particles in the coolant caused the clamping mechanism to operate erratically and also position the work irregularly. As a result, rejects were excessive and so was the dimensional compensation. The production rate averaged 500 pieces per 8-hour shift, with 2 hours downtime per shift required for machine adjustment, cleaning and dimensional correction.

The Alsop filter was installed with sufficient rate of flow to provide for adequate recirculation of clean coolant. Production of acceptable parts increased from 500 to 700 pieces per shift. The clamping mechanism operates accurately and effectively. Reworkable rejects have been reduced by 75%. Machine downtime for adjustments and machine cleaning has been reduced from 2 hours per day to 2 hours per week. Surface finish is now being held to 5 microinches with one pass grinding and 2 microinches with two pass grinding.

These applications illustrate the effect of clean coolant in providing for the grinding machine and wheel to obtain the accuracy and finish they are designed for. • • •

Ten preselected clarity levels are available when using the Alsop filters which enable the operator to select the degree of cleaning needed.



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Finishing Touch

"It goes without saying that quality finishes are essential in our business," says Leavens Manufacturing Co., Attleboro, Mass., makers of fine jewelry, emblems and premiums. "We get best results in enamel polishing by using a Paramount soft wheel with grade F pumice. Paramount Felt Wheels cut faster, last longer and give us better quality than any other type we have used."

How about the finish on *your* products — does it meet the standards you and your customers have a right to expect? If not —

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Felt Wheels
Bobs, Sheet Felt

Bacon Felt Co.
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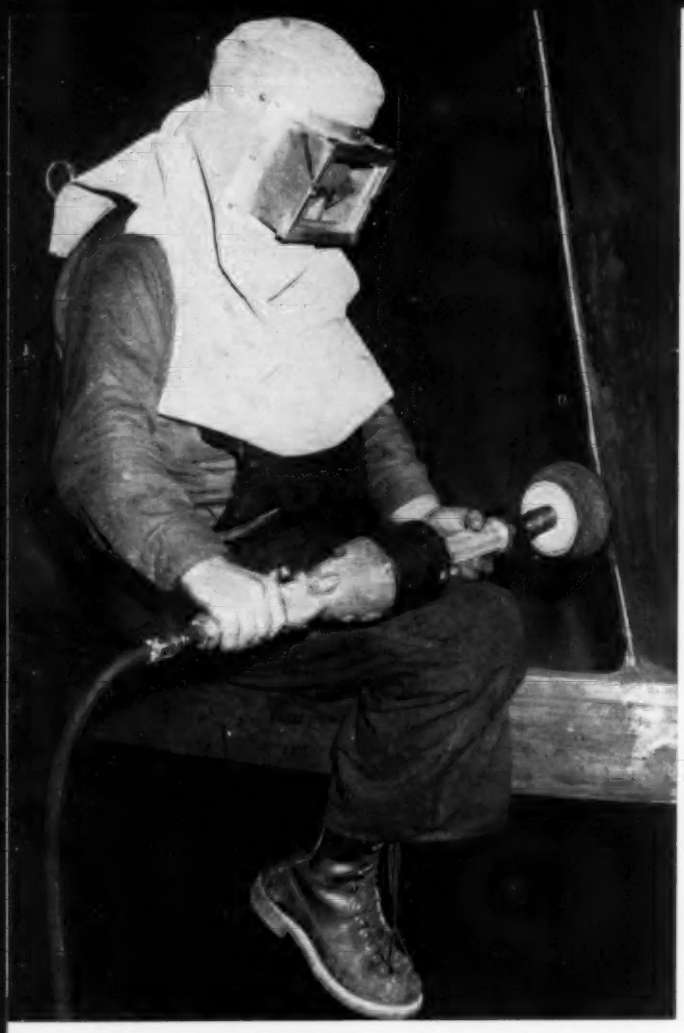


Worker grinding down stainless steel patches covering damaged area. Note the special hood.

GRINDING TURBINE BLADES AT GRAND COULEE

When downtime means a loss of $5,000 in revenue per hour, grinding wheels have to cut fast and freely.

By RICHARD L. McKEE
Associate Editor

● Repairing pits and rust spots in the turbines and on the impellers or turbine blades deep down in the penstock area of the Grand Coulee Dam is one job where the grinding wheels must cut fast with no loading. Downtime is valued at $5,000 per hour.

At the dam site there are two types of turbines, powerhouse turbines to drive the electric generators, and pump house turbines to pump water into an irrigation reservoir. Two of the former and one of the latter are repaired each year.

The turbines measure 15' in diameter and 8' in height. The blades are 5' long and 7' in height. Of airfoil design, the blades are 8" thick at their thickest point.

When a turbine is to be repaired, the water is shut off and the turbine, shaft and generator all stop. Then the welders, wearing steel helmets and special face shields supplied with fresh air under pressure, scarf the rusted and pitted spots—cavitation is the technical term for them—fill the voids with stainless steel welding rod, and grind down the excess metal with portable air grinders to blend with the contour of the blade. When all repairs and grinding have been completed, the entire surface is painted with a tar base paint.

Average wheel usage per turbine is about 600 grinding wheels, divided almost equally among 6" x 2" x 5/8" straight wheels, 6" x 4¾" x 2" x 5/8" flaring cup wheels and 3" x 3" Type 18-R plugs. A typical specification for the first two kinds is a resinoid-bonded 20 grit aluminum oxide wheel, M grade, 7 structure. The plugs are similar, excepting that they are harder, P grade instead of M.

For the cup wheels, right angle grinders with a speed of 4,450 rpm are used, while the straight wheels and the plugs are mounted on 6" straight grinders whose speed is 5,300 rpm.

In one test, an area of stainless weld 6" square by 1/8" in excess height of buildup was ground in 10 minutes and 28 seconds total contact time, using up one flaring cup wheel of the size and specifications indicated above. • • •

Stainless steel patch on a pump impeller, before grinding and contouring.

(Photographs courtesy of U.S. Department of the Interior, Bureau of Reclamation)

Stainless steel patch on a pump impeller after four months' service. While no new pitted areas have appeared, some "pin holes" are indicated by rust spots.

there's a place for PRESSURE BLAST in your plant

Rough cleaning problem? Parts delicate or intricate in shape? Micro-inch finish requirements close? *Pressure Blast* removes scale, oxides and all types of discoloration without stock removal. Delivers RMS readings as low as 6.

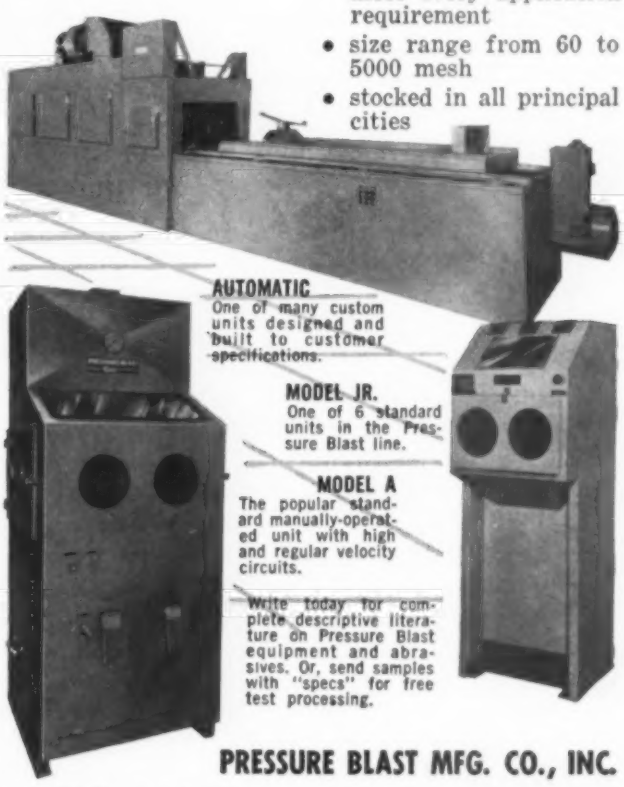
Hand deburring sending costs up? *Pressure Blast* can do the job! Regardless of burr location or size, type of metal, if it's a true burr and not extruded, *Pressure Blast* can handle it.

Having difficulty preparing surfaces for plating? *Pressure Blast* offers basis metal cleanliness and microscopically etched finished for strong mechanical and electro-chemical bond.

And that's not all . . . with *Pressure Blast* you can reduce die and mold maintenance costs, hone HSS and carbide cutting tools for longer work life, increase lubrication retention of bearing surfaces, blend tool marks and hundreds of other cost-cutting applications.

Pressure Blast abrasives for *all types* of wet blast equipment

- 8 different materials meet every application requirement
- size range from 60 to 5000 mesh
- stocked in all principal cities


AUTOMATIC
One of many custom units designed and built to customer specifications.
MODEL JR.
One of 6 standard units in the Pressure Blast line.
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The popular standard manually-operated unit with high and regular velocity circuits.

Write today for complete descriptive literature on Pressure Blast equipment and abrasives. Or, send samples with "specs" for free test processing.

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Another **MANHATTAN "FIRST"...**

The **Original** SAFETY BACK WHEEL DEVELOPED IN 1956

MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

SAFETY BACK far surpasses such safety features as anchor bushings, safety rings, special hub mountings, or ordinary revolving cup guards. With SAFETY BACK, steel covers the *entire* back of the flared cup . . . extends down the side to offer a degree of reinforcement and breakage resistance never before possible!

NO OTHER WHEEL—AT ANY PRICE—OFFERS THESE EXCLUSIVE FEATURES

- **Greatest Initial Strength**
- **Highest Safety Factor**
- **Easy Mounting—Easy Operation**
- **Improved Mounting Base**
- **One Piece Assembly**
- **Requires No Adjustment**

Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

RM-959

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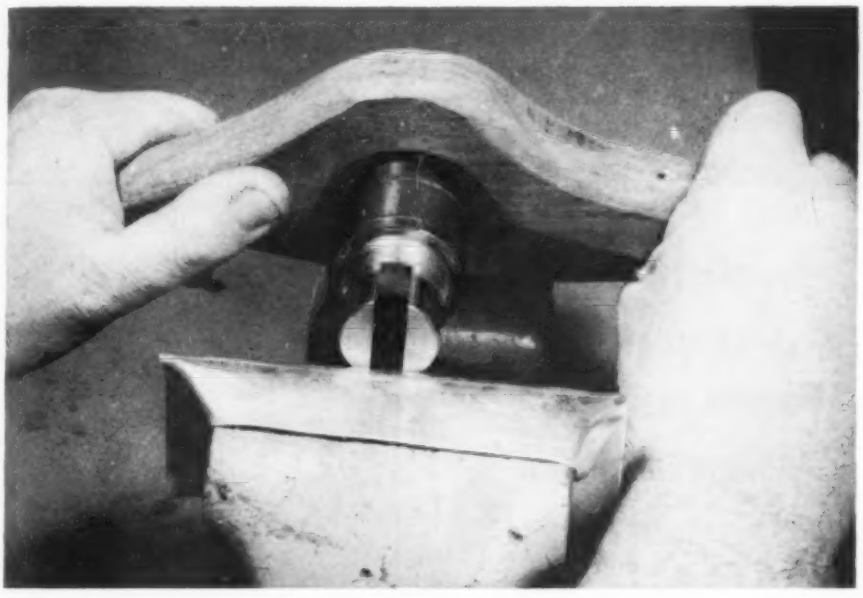
Ideas from the Shop



Draw polishing a piston with ultra-fine lapping powder, using a concave wooden hand lap faced with leather belting.

Shimming the tailstock of a universal grinder to grind slight tapers on cylindrical work.

HAND DRAW POLISHING FINISHES PISTONS, PLUNGERS

By H. J. Gerber

● Hydraulic and air pressure systems make use of many types of pistons and plungers which move axially in cylinders. Often the surface finishing of these pistons is highly critical as they must seal against leakage without packing or rings. Surface finishes must be in terms of very low micro-inch ratings and the lay of the finish must be in the direction of movement so as to permit small frictional resistance and long wear life.

After cylindrical grinding and ring lapping of plungers and cylinders we often "draw polish" the surface with ultra fine lapping powder as a cutting medium. The lapping tool consists of a concaved wooden hand lap which is faced with leather belting. The work is held in a vise and the lap, generously charged with an oil vehicle compound, is worked back and forth axially along the surface of the cylinder while the work is periodically revolved to new working positions.

Usually it is planned to remove only one or two tenths of a thousandth on the diameter and if grinding and ring lapping has been carefully done this is usually sufficient to remove any circular tooling marks left by these operations.

SHIM UNDER TAILSTOCK SETS GRINDER TO SLIGHT TAPER

By H. J. Gerber

● We quite often have occasion to grind very slight tapers on cylindrical work, jobs like lathe mandrels which

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ELGIN DIAMOND RECLAIMING SERVICE

assures
guaranteed return of (all) diamond content

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have only six or eight thousandths taper per foot being a good example.

Rather than disturb the accurate parallel setting of our cylindrical universal grinder by pivoting the table we use the illustrated method for making the desired small setting. A thin paper or metal shim is slipped between the bottom of the tailstock and the top of the table on either the forward or back side. This shim has the effect of offsetting the tail center the few thousandths required. Whether to put the shim at back or front depends upon whether the tailstock end of the work is desired to be large or small.

Upon completion of the job—which might be just one piece of work—the shim is removed and the machine is again back to perfect parallel position.

This simple scheme has been a great timesaver and has become standard procedure for all jobs of this nature.

WHAT'S YOUR IDEA?

Ideas from the Shop is basically the same department that we used to call **SHOP HINTS**—practical suggestions from shop men to other shop men, the unwritten short cuts that every shop develops. Only the name has been changed. So . . . **What's YOUR Idea?** Our other readers would like to know, and you'll be paid for it to boot. Send your ideas to IDEAS EDITOR, GRINDING and FINISHING, Hitchcock Publishing Co., Wheaton, Illinois.

LAPPING MILLING MACHINE CUTTERS

By H. J. Gerber

● Cutting edges of teeth on the side surface of milling machine cutters can be greatly improved by the simple lapping operation shown in the illustration. The process is suitable for all side and face milling cutters. This process is not intended for use on dull cutters but should be a final operation after the usual finish grind with a fine grit wheel on the tool and cutter grinder.

The lapping operation is performed as shown by laying the cutter on a cast iron lapping plate which has been covered with a fairly coarse commercial lapping paste. The cutter is moved over the plate with a circular motion and is lapped only enough to put a barely discernible flat on the land of each

tooth. This operation will certainly remove some relief from the land so it should not be overdone. As a matter of fact this removal of relief will actually strengthen the cutting edge and if the flat is only a few thousandths wide it will not impair the relief to any noticeable extent.

This lapping process accomplishes the following two improvements:

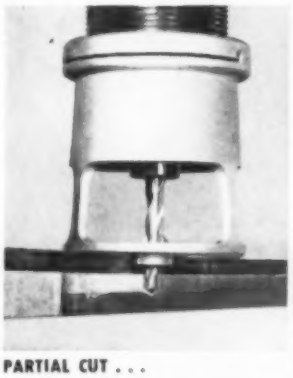
1. Any high cutting edges will be lapped down to a common plane with the remaining teeth and consequently will not chip or dull down prematurely when the cutter is first used. This will prolong the between-grinding life of the whole cutter.

2. All cutting edges will be refined due to the lapping off of the highs on the usual "saw tooth" edge left by the grinding process.

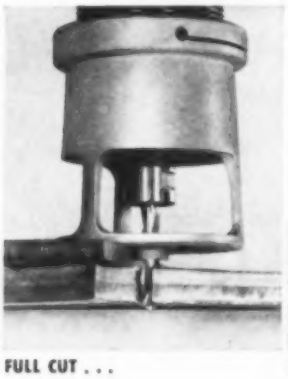
Lapping a milling machine cutter on a cast iron plate with a fairly coarse lapping paste.

Before beginning to lap it is desirable to coat the lands of the cutter with blue layout fluid. This makes it possible to observe the extent to which the cutting edges are being worked down and to stop lapping when a bright line begins to show up along each cutting edge.

In the case of the side milling cutters which have been reground quite a number of times it will be found that the hub of the cutter will protrude beyond the tooth plane. It will be necessary to lap on a plate which has a relieved cavity into which this hub can be dropped.



PARTIAL CUT . . .



FULL CUT . . .

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PROTECTING GRADE MARKINGS ON GRINDING WHEELS

By H. Landauer

● Few things can be more irritating than a stock of grinding wheels with grade markings faded beyond recognition.

On all of our present stock of wheels, as well as on any new ones being purchased, we cover the markings on both sides with transparent cellulose tape. In this way the identifying data will be protected during the life of the wheel.

CLAMP DIAMOND HOLDER AIDS QUICK WHEEL TRUING

By H. J. Gerber

There is frequent use, in cylindrical grinding, for a clamp-on truing diamond holder. This is the style of holder often used on lathe tool post grinders and has a "V" seat for clamping to a cylindrical surface.

It is often much more convenient to set up a diamond by clamping it directly on the work or on a scrap shaft held between centers than it would be to remove the work, move the tailstock, and mount a table support for the same operation.

With the illustrated method the clamp holder can be secured to the work

Truing a grinding wheel with a diamond held in a clamp-on holder. Note the soft sheet metal to protect the surface of the shaft.

without disturbing the set-up in any way except to run the wheel head back the necessary amount.

If the clamp holder is secured to a finished surface it would be a good idea to place a strip of soft sheet metal around it before placing the clamp in order to prevent any possible marring of the surface.

Rapid stock removal and long wheel life with high pressure mechanical grinders . . .

CORTLAND WHEELS FOR STEEL CONDITIONING

We like to lick grinding problems

– and the bigger they come, the better we like 'em. A lot of our steady customers started this happy association by saying "Let's see what Cortland can do." How about you?

Cortland is now manufacturing high density grinding wheels by an improved hot molding process.

This process produces wheels that are superior in toughness and density to those usually obtainable through conventional methods.

Tests in steel conditioning mills, using 24 x 3 and 20 x 2½ sized Cortland wheels on high pressure mechanical grinders, have been highly satisfactory. We would like to demonstrate our wheels in your mill.

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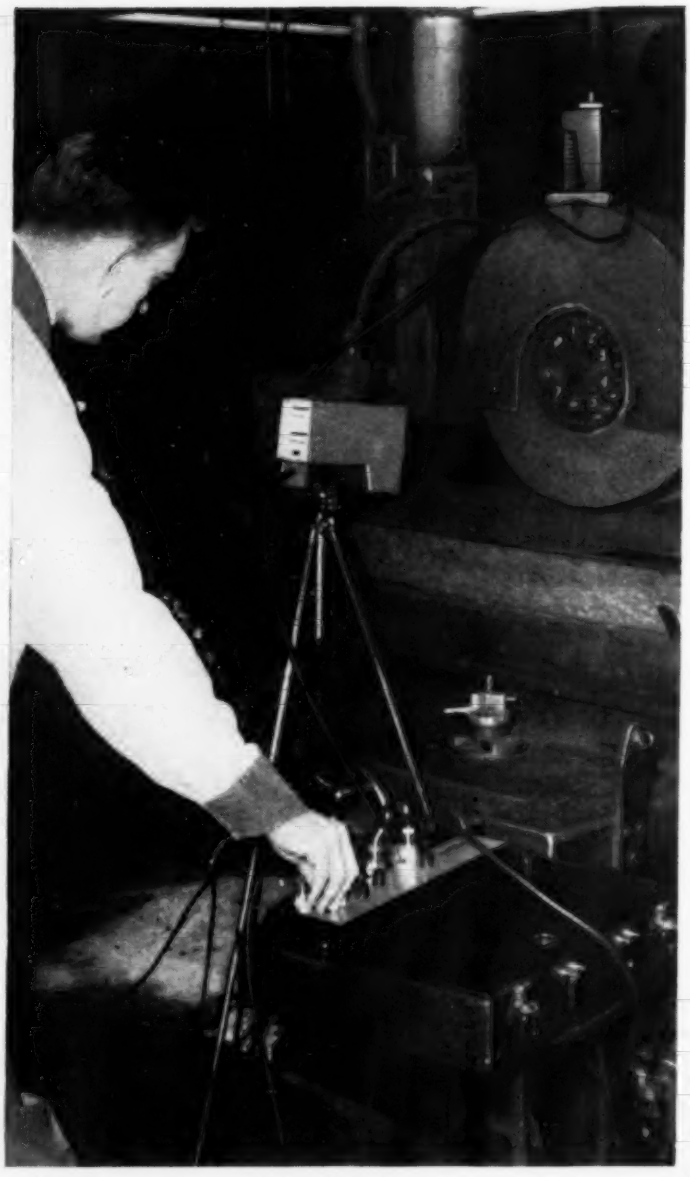
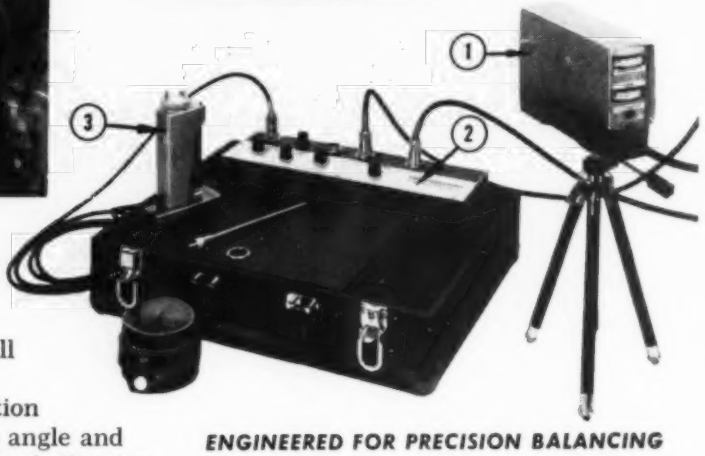


New Stewart-Warner Portable Balancer balancing grinding wheel

now! PRECISION GRINDING WHEEL BALANCING

priced for even smallest shops!



The Versatile New Stewart-Warner Portable Balancer is priced to make it economical for even small shops to own their own balancing equipment. Its portability permits easy *in-place* balancing and vibration analysis of grinding wheels and machinery. Indicates angle and amount of unbalance . . . determines rpm and amount of vibration. Helps produce finer finishes and closer tolerances . . . prolongs life of wheels . . . permits longer runs between dressing. Also balances many other machine parts, such as drive motors, spindles, coolant pumps and adapters.

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. . . designed for ease of operation. (1) Stroboscope and meters mounted in same portable head for easy one-man operation. (2) Removable, lightweight electronic unit for easier balancing in confined spaces. (3) Electro-magnetic pickup can be simply placed on machine part, freeing operator's hands.

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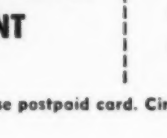

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Grinding and Finishing

JUNE, 1959

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Literature

1. Measuring Instruments. Bulletin E describes and illustrates, with specifications, the new Pet-line gages and measuring instruments. These include: Model A comparator, adaptable to any dial indicator; lightweight, portable Model B comparator; depth gages, two- and three-hole models; weighted indicators, and magnetic base indicator support. Petz-Emery, Inc., Pleasant Valley, N.Y.

2. Wheel Dresser. The value of the Contour Rex for unlimited form dressing on any machine tool grinder is pointed out by case histories in the manufacturer's brochure. It is suitable for wheels up to 14" dia. and 3" wide, and makes easy dressing of a full 180° concave radii as small as .003". Vital points are outlined on the use of the rectifier, which provides the accuracy and wide range of the dresser. Form-All Mfg. Co., Long Valley, N.J.

3. Multi-Purpose Flexible Shaft Machines have five to seven speeds and are adaptable to all jobs requiring frequent speed changes. The literature illustrates the type R-Quint and type R-Mammoth models for handling jobs involving milling, filing and polishing, as well as special work. Table includes 250 to 36,000 rpm with further specifications. American Rotary Tools Co., Inc., 10432 W. McNichols, Detroit 21, Mich.

4. Die Barbering Wheels, Sticks & Stones, Finishing Compounds—these are covered in a very comprehensive handy wall chart offered by The Carborundum Co., Niagara Falls, N.Y., with specifications listed in quick reference form. Data covers gradings for cones and plugs for portable grinding of various materials. Fine, medium and coarse grains are covered in specifications for finished sticks and stones for tool and die work. Finishing compounds are designed for items such as dies and molds, and various gages, with their operations and gradings specified. Numerous other products are fully described.

5. Internal or Plain Cylindrical Grinder. Bulletin 302 describes the Sundstrand-Arter dual-purpose grinder, for tool room or small production grinding, which can be arranged for either internal or external grinding simply by changing the wheelheads. Maximum feed is .0005", minimum is .0001" at each table reversal. Maximum capacities are: external, 3" O.D.; internal, 3" I.D. Sundstrand-Arter Grinders, Div. of Sundstrand Machine Tool Co., Rockford, Ill.

(See Number 1)

(See Number 2)

(See Number 3)

6. Reducing Bushings. Red Center reducing bushings facilitate changing wheel hole size as well as eliminating the need of carrying large stocks of different size wheels, according to flyer offered. Bushings apply to 1¼" holes, and reduce to 1", ⅞", ¾", ⅝" or ½". Recommended uses and instructions for ordering are also included. Simonds Abrasive Co., Philadelphia 37, Pa.

7. Dust Collectors. Illustrated literature presents the portable easily-installed Dustkop 520 which is designed to collect dust from single machines. There are 46 models to choose from. They are designed especially for use with surface grinders, tool and cutter grinders, offhand grinders, buffers, and other small wheel equipment. Aget Manufacturing Co., 1408 E. Church St., Adrian, Mich.

8. Measuring Instrument. The Go-Devil monitor can be set to size in a matter of seconds and needs no setting masters, according to literature from the company. It functions as a self-mastering comparator, measuring machine, and dial indicator checker, and illustrations demonstrate use of the instrument in these three capacities. Accuracy is reported to better than .00005", with range 0.000" to 1.500". Go-Devil Instrument Co., 624 Dutchess Turnpike, Poughkeepsie, N.Y.

9. Diamond Cut-Off Wheel. Diatronic diamond wheels, with built-in tolerance, are described in literature as giving narrower, smoother cuts on industry's toughest materials. A rim width of .006" accurate to a maximum total tolerance of .0005" is provided, according to literature offered. The wheels cut tungsten carbide, corundum, aluminum oxide and glass. Navan Products, Inc., International Airport, Los Angeles 45, Calif.

10. Surface Grinding. "Work Done on the Blanchard," fifth edition, and "The Art of Blanchard Surface Grinding," fourth edition, are now available from The Blanchard Machine Co., 64 State St., Cambridge 39, Mass.

11. 24" Tilting Rotary Table, modified for sidereal rate of rotation, is described in flyer as equipped with an Electrolimit measuring system, and special motor drive and gearing, to provide a stationary platform for the calibrating and testing of navigational gyroscopes. Eight nominal speeds are selected by electromagnetic clutches. Pratt & Whitney Co., Inc., Charter Oak Blvd., West Hartford 1, Conn.

12. Barrel Finisher makes easy polishing, finishing, burnishing or deburring, according to flyer. The Pako Rock-N-Roll barrel finisher is offered with barrel sizes of 8" dia., 11" dia., and 15" dia., with electric or pneumatic clutch. Price sheet is also available. Pako Corp., 1010 Lyndale Ave. No., Minneapolis 40, Minn.

(See Number 8)

(See Number 13)

13. Disc Grinder. 8-page, illustrated Bulletin DH4 gives vital data on the new DH4 double horizontal spindle disc grinder, which makes disc grinding virtually automatic. Featured are simplified push-button operation, accuracy to tenths, built-in dials, indicators, and gages. Detailed mechanical drawings and specifications data are given. The machine grinds parts such as bearing races, piston rings, and any parts with two flat surfaces of nearly equal area. Besly-Welles Corp., South Beloit, Wis.

14. Safety Goggles. The 707 series of plastic frame safety goggles, in bronze, green and flesh colors, are described in leaflet. Lenses are also offered with prescription plus protection. Instructions for measuring and ordering are included. Sellstrom Manufacturing Co., Palatine, Ill.

(See Number 15)

15. Dust and Fume Control Systems. Sixty different plant installations are illustrated and described in a new three-color, 52-page catalog. Multi-page sections are devoted to systems for the ceramic, foundry, grain, metalworking, steel and woodworking industries. Series C centrifugal collectors, type M and type W unit collectors are discussed with complete specifications. The Kirk & Blum Manufacturing Co., Cincinnati 9, Ohio.

16. Precision Grinding Service. The company reports advanced facilities for full capabilities of every grinding process, as described in folder. Typical standards for center, centerless and internal grinding are provided in a table guide. Special finishes, tolerances, and other exacting specifications are developed to individual requirements. Horberg Grinding Industries, Inc., Bridgeport, Conn.

17. Magnetic Separator. A new compact Magnaflo separator unit for the automatic removal of ferrous solids from cutting oils and other soluble coolants is described in brochure offered. The separator is reported to be fully automatic, operates without attention and is virtually free of maintenance expense for the life of the equipment. Specifications and Magnaflo selection chart for viscous oils are included. U.S. Hoffman Machinery Corp., Dept. LR, Thompson Road Plant No. 1, Syracuse, N.Y.

18. Diamond Wheels. Steelset sintered steel bond diamond wheels, for wet grinding, are described in Catalog DT-353 as fast cutting and long lasting. Metal-bonded quality products are offered in standard and special sizes and shapes for grinding, electrolytic grinding, honing, lapping, slicing, dicing, drilling, and other operations. Fish-Schurman Corp., 70 Portman Rd., New Rochelle, N.Y.

19. Coated Abrasive Products. Featured is the internal Rotofinisher for finishing or polishing of tubes and cylinders. Specifications cover a complete range of grit sizes from coarsest to finest, with prices also. Other items illustrated and described are cartridge rolls (glue and resin bond), abrasive spirals (glue and resin bond), bands, discs, wheels, mandrel mounted wheels, and mandrels. Field Abrasive Manufacturing Co., Inc., 1303 Stanley Ave., Dayton 4, Ohio.

20. Grinding Attachments. Catalogs are offered by the manufacturer to present the use of his grinding attachments for lathes, planers, boring mills, milling machines, and shapers to provide for grinding operations. Attachments are available with or without horizontal or vertical feeds. The United States Electrical Tool Co., 3644 Llewellyn St., Cincinnati 23, Ohio.

21. Gaging Products. A new 12-page brochure on black granite gaging products features a selector chart listing 432 combinations of plate sizes, ledges and overall accuracies that simplifies the selection of a surface plate. Three different grades are offered: AA (with a tolerance of 25 millionths) for laboratory work, A (with a tolerance of 50 millionths) for inspection work and B (with a tolerance of 100 millionths) for shop work. Also included are products such as plate stands, and gaging accessories such as angle plates, straightedges, and parallels. The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.

22. Flexible Shaft Machines (in four models), designed especially for "small work" industrial grinding, finishing and

(See Number 17)

revolutionary

the "Throw-A-Way Hub"

The birth of an "idea" develops into an unchallenged "leader"

A design and construction accomplishment that insures cost reduction to small and large users — Performance outstanding.

The "Thro-A-Way" is **safer — ruggeder — faster.** Only one specification manufactured for metal removal. No inventory "build up problems".

For use on all right-angle grinders pneumatic or electric. Withstands greater peripheral speeds.

ELIMINATES:

Geo. H. Bullard

COMPANY INCORPORATED

ABRASIVE PRODUCTS WESTBORO, MASS.

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(See Number 19)

(See Number 21)

deburring, are presented in Catalog 210. A wide variety of handpieces to fit to the work are shown. Flexades illustrated convert any drill press, electric drill or motor into an efficient flexible shaft tool. Foredom Electric Co., Inc., Bethel, Conn.

23. Diamond Dressing Tools. Industrial diamonds and accessories for their use are covered in ASA B67.1-1958, which is intended to establish shank dimensions of diamond tools used for dressing or trueing grinding wheels. General definitions and classifications are presented. Straight shank and headed shank tools (either single or multiple diamond) are diagrammed with sizes given. American Society of Tool Engineers, 10700 Puritan Ave., Detroit 38, Mich.

24. Pneumatic Grinders. Bulletin 67 presents the Airetool pneumatic production tools. Airetool Model 700-V pneumatic grinder is easy to handle with 6" cup wheel or brush, in 4500 or 6000 rpm models. Model 500-V pneumatic sander takes 7" sanding discs, and is available in three models with 2300, 3000 and 4000 rpm speeds. Airetool Manufacturing Co., S. Center St., Springfield, Ohio.

25. Dust Collectors. The DusKolector catalog contains helpful engineering information and interesting installation views. The Hammond DusKolectors are reported to provide healthier working conditions, protect costly machines, and reduce cleaning and painting costs. Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich.

26. Instrument for Work Standards and Control. The Workometer instrument measures the energy machines use in producing products, and allows a work standard to be established, according to brochure offered. The instrument is used for work standards, incentives and control on many operations, not only grinding and finishing. Stewart Instrument Co., 6507 Grand River Ave., Detroit 8, Mich.

27. Flexible Abrasive Wheel. The Grind-O-Flex wheel, for contour finishing, consists of hundreds of "leaves" of abrasive cloth sealed to a core that wipes into and around hard-to-reach areas faster and more effectively than any abrasive method, hand or machine, according to brochure offered. Wheels are available in a variety of grits. Sizes range from 2" to 16" dia. Merit Products Inc., 3691 Lenawee Ave., Los Angeles 16, Calif.

28. Belt Sander. Illustrated literature demonstrates the value of the Wall Tu-Way belt sander, used either vertically or horizontally. It makes use of a full 1/3 hp G.E. motor. Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N.Y.

29. Magnetic Base Indicator Holder, called the Erick Magna Holder, is featured in Catalog No. 958. Its magnetic field can be turned on and off by merely pushing the control button. In addition, the unit comes complete with all necessary attachments to accommodate all types of dial and test indicators. Illustrations, descriptions and specifications cover the various models of the holders. Dial indicators and permanent magnets are also described. Cullen Manufacturing Co., Racine, Wis.

30. Rotary Files. Catalog available offers ground cut rotary files for soft metals; hand chisel cut for hard metals; carbide rotary files, and salvage and regrinding service. Rota File Corp., 1328 58th St., Brooklyn 19, N.Y.

31. Air Tools. Catalog G-10 lists all Buckeye air tools—drilling, fastening, abrasive and specials. Buckeye Tools Corp., P.O. Box 966, Dayton 1, Ohio.

(See Number 22)

Microhoning Film

The principles and applications of Microhoning are explained in a 16 mm, 30 minute sound movie, "Progress in Precision."

All types of cylindrical surfaces, including small diameters and combinations of soft and hard metals (interrupted by keyways, undercuts, ports, reliefs or cross holes) are reported to be economically Microhoned to precision tolerances and alignment.

Copies of the film may be obtained from Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 38, Mich.

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When you dress grinding wheels regularly you clean loaded pores, uncover fresh abrasive grains — GET NEW PERFORMANCE AGAIN AND AGAIN. Dressing makes every wheel more efficient. In the complete Desmond line there is a dresser to meet your requirement—at low cost. A typical Desmond-Huntington dresser* costs less than $3.00: replaceable cutter sets average 36c. Ask your Desmond distributor's advice.

The only complete line of grinding wheel dressers and cutters

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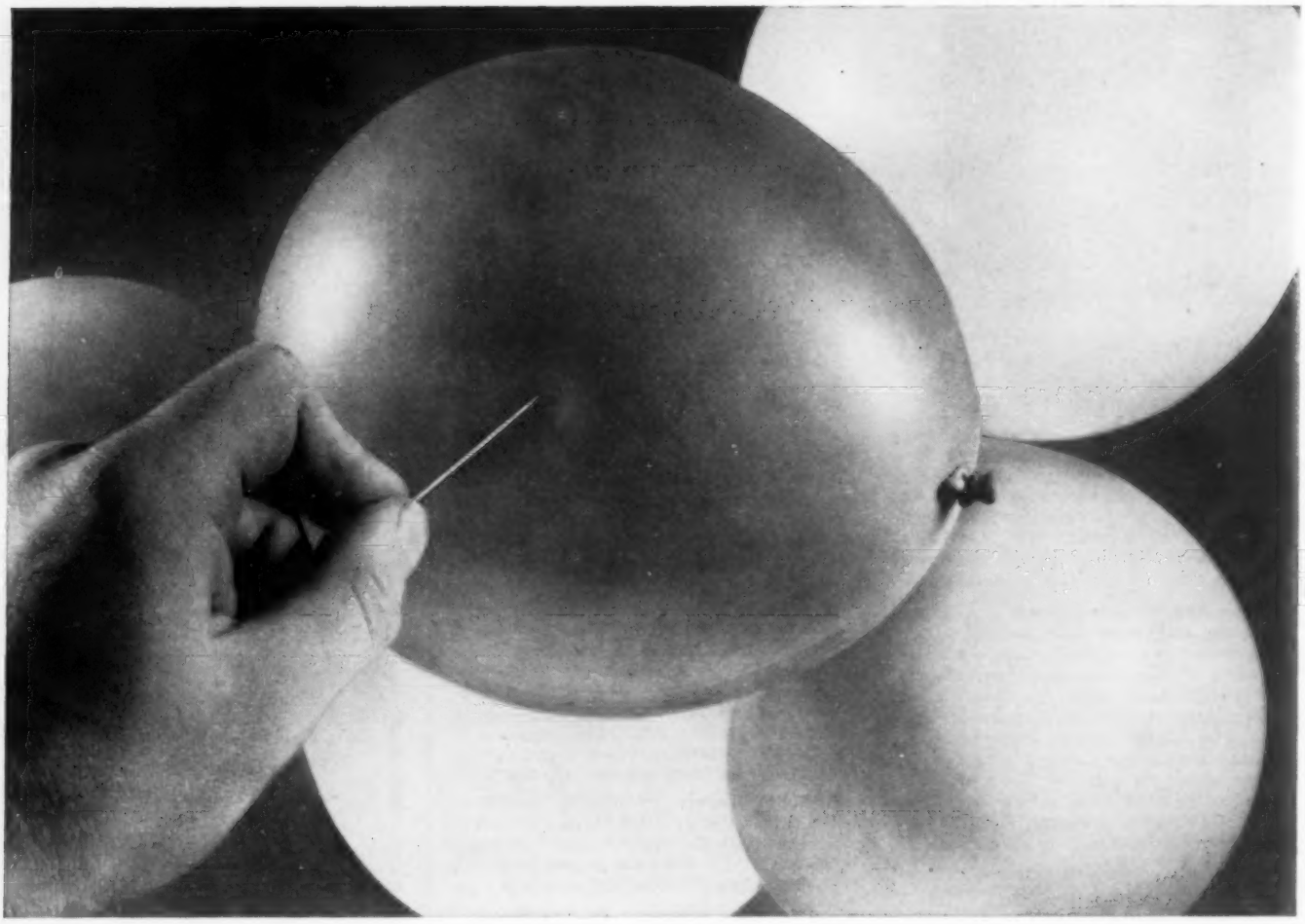

Machine Tool Buyers:

Beware the fallacy of projecting today's labor rates!

Almost without exception, machine tool replacement formulas employ an erroneous factor in computing savings — they are based on *today's* labor rates.

It seems basically sound to suggest, in the case of a contemplated investment in equipment, that a projection be made as to the estimated period over which the equipment is to be used.

Assuming this to be ten years, it is a fairly simple matter to project the *average* wage rate over the next ten years by using the historical increase for the past several years. This increase is known to be from 5 to 6% per year.

Using 5%, we then have a simple computation to determine the average projected wage rate which should be used in computing savings in a replacement formula.

Assuming a current wage rate of $2.50 per hour, this becomes $4.07 per hour at the end of ten years, or an increase of 62.8% over today's labor rate.

This percentage increase could reasonably be applied also to other factors in the computation of savings, such as indirect labor, fringe benefits, maintenance, etc.

In contemplating the purchase of a piece of equipment which will last for a number of years, it is fallacious, therefore, to compute savings in terms of today's costs only.

Does Jones & Lamson offer a positive approach; a realistic, workable formula that is free from fallacies such as this? *Yes!*

Write today for complete information.

the man who needs
a new machine tool
is already paying for it

JONES & LAMSON Machine Company, 531 Clinton St., Springfield, Vt.

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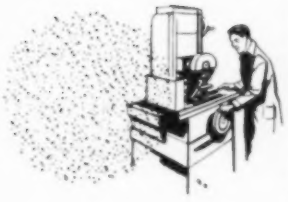
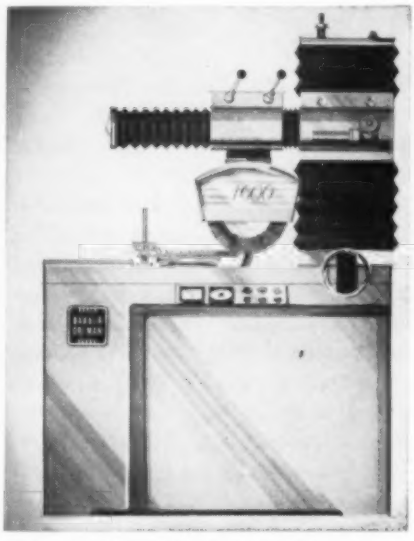


Equipment and Materials

New Machine and Wheels Offer New Concept in Gear Deburring

A new concept in the automatic deburring of gears and sprockets, which again combines coated abrasives with a machine tool operation, has been announced by the 3M company. Two major



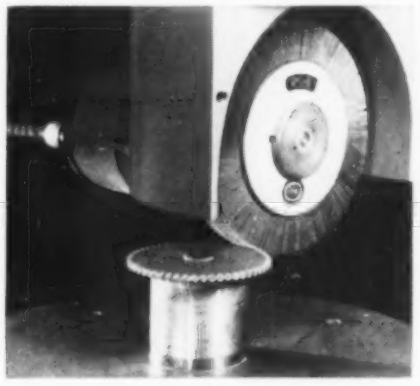
This is the Model 1600 Barber-Colman gear deburring machine, which uses PG wheels for deburring helical and spur gears as well as sprockets.

advantages claimed for the method are: Consistency in profile from tooth to tooth, and from gear to gear; and complete protection from the gear face, which is often subject to impingement using other methods.

The deburring is accomplished as a specially designed, formed "PG" wheel moves by hydraulic action into working position, automatically feeds into contact with the gear, and retracts to the starting position at the end of a pre-specified contact period—all on a push-button cycle. The wheel and gear spindles operate in a timed relationship so that the work indexes one tooth for each revolution of the wheel.

The wheel is made of hundreds of die cut leaves of coated abrasive (aluminum oxide mineral resin-bonded to a cloth backing) fabricated into a wheel and locked at the hub with aluminum flanges.

The formed wheel permits the grinding of a small chamfer on the complete tooth profile, which is especially



Wheel and gear are in a timed relationship so that the gear indexes one tooth for each revolution of the wheel.

important on helical gears where the acute angle on one side of the profile may distort or burn during hardening.

Production models of the machine, manufactured and sold by Barber-Colman, will employ "PG" wheels in the 6" to 14" diameters, and the Model 1600 will accommodate gears up to 16" outside diameter. Larger capacity machines can be built.

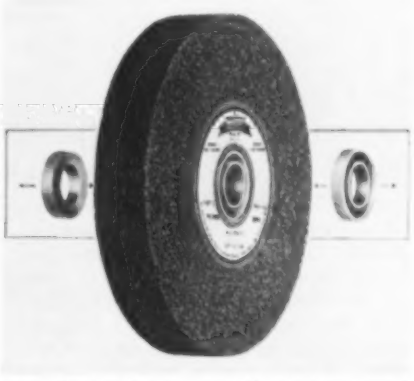
Minnesota Mining and Manufacturing Co., Dept. F9-154, 900 Bush Ave., St. Paul 6, Minn.

Use postpaid card. Circle No. 32

Bushings Provide Quick Change of Grinding Wheel Hole Sizes

Quick change of grinding wheel hole sizes is accomplished with the new Red Center plastic reducing bushings. They are designed for grinding wheels with 1¼" hole to reduce the hole size to 1", ⅞", ¾", ⅝" or ½". They are removable and can be used on conventional lead or plastic bushed wheels. They offer conveniences to users who wish to use wheels on other machines. Many toolroom wheels are used with 1¼" and ½" holes. These bushings permit a quick conversion.

A slight taper on the outside diameter of the bushings provides easy insertion and snug fit. This does not impair concentricity, truth or balance of the wheel, it is reported. Grinding wheel users re-



port the bushings provide an improved grinding action—less vibration and better finish—due to a slight dampening effect from the resiliency of the bushing material.

Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

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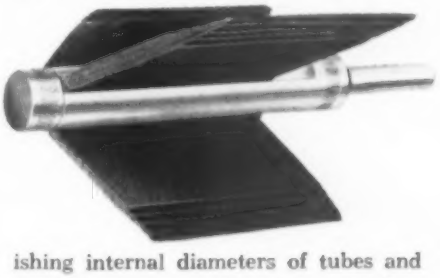
Internal Finishing Tool for Tubes & Cylinders

The Rotofinisher, an economical method of cleaning, deburring and pol-



ishing internal diameters of tubes and cylinders, is reported to enter cylinders at high speeds without chamfering of

work. Two types of models are available. Self-centering action provides for positive, even finish.

The tool is reversible for bottoming and extended life of fillers. Fillers, which may be economically replaced, are composed of abrasive cloth layers. The tool covers a complete range of grit sizes from coarsest to finest.

Special sizes and shapes of the tool are available upon request.

Field Abrasive Manufacturing Co., Inc., 1303 Stanley Ave., Dayton 4, Ohio.

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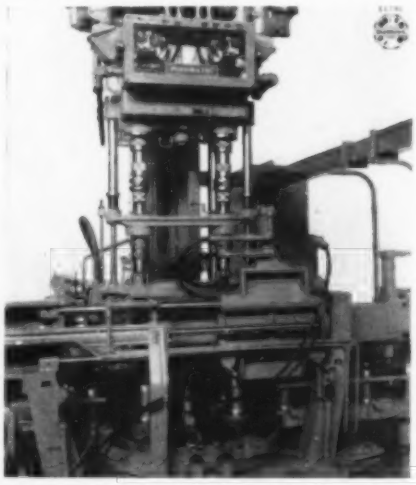
Cylinder Sleeves Are Honed Automatically

Complete automation in the honing section of a cylinder sleeve production line was achieved by the use of a BarnesdriL Model No. 307-2 vertical type honing machine and a special fixture assembly.

Three manually loaded and unloaded single-spindle honing machines were previously used to attain the production quota. By incorporating a two-spindle reciprocating head and completely automatic load and unload mechanisms on the No. 307 honing machine, operator attendance was reduced to a minimum. Stock removal was .002" to .004". A 25-35 rms finish requirement was achieved.

The honing machine is arranged with twin cylinder hydraulic reciprocation and controls for infinitely variable reciprocation rates from 10' to 75' per minute. Included with the two-spindle reciprocating head are: electronic hone expansion and Plugmatic automatic bore-to-bore sizing.



BarnesdriL Model No. 307-2 vertical type honing machine arranged for two-spindle reciprocating head and consisting of: electronic hone expansion, twin cylinder hydraulic reciprocation, Plugmatic bore-to-bore sizing.

The hone expansion features automatically-controlled rapid expansion and collapse, electronically measured and infinitely adjustable hone feed, automatic compensation for stone wear and individual feed for each spindle.

The hydraulically-operated automatic fixture assembly controls are electrically interlocked with machine controls to reduce operator functions and minimize cycle time.

A two-position rotary index table 18" in diameter is mounted on a non-adjustable fixture table.

Barnes Drill Co., 886 Chestnut St., Rockford, Ill.

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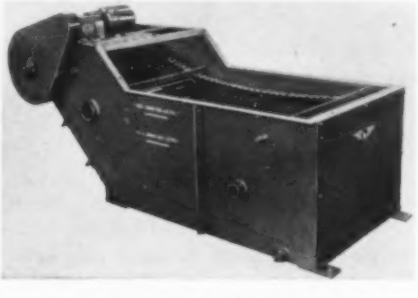
Magnetic Separator Is Self-Cleaning

The Hoffman Magnaflo separator unit, designed for the automatic magnetic removal of ferrous solids from cutting oils and other soluble coolants, is re-

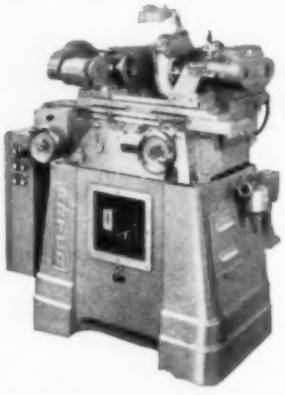


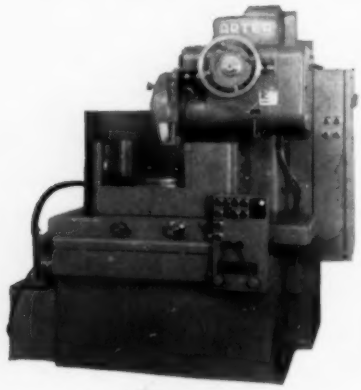
Proved grinder design that pays off in performance

Better surface finishes — smoother, more concentric — to meet the higher accuracy standards of today's industry are assured whenever a Sundstrand-Arter grinder does the job. Ease of control, simplicity of operation, and high work output mean lower grinding costs, too!

Cylindrical Grinding — Internal and External

This versatile machine converts simply by changing wheelheads and is suitable for toolroom or production work requiring a small capacity machine. Complete hydraulic movement of table and wheelhead, centralized pushbutton controls, and diamond wheeldresser with graduated dial are standard features. Maximum feed is .0005", minimum is .0001" at each table reversal. Maximum capacities are: External, 3" O.D., Internal, 3" I.D.





Rotary Surface Grinding

Compact, vertical design and rigid construction allows greater chuck pressure and greater stock removal. Machine has reciprocating table, rotating magnetic chuck of either 12" or 16" capacity, variable stepless speeds for chuck rotation and table traverse and manual or automatic wheelhead feed. Work table tilts for either concave or convex grinding.

Write today for details on these and other Sundstrand-Arter grinders.

SUNDSTRAND ARTER

SUNDSTRAND-ARTER Grinders

SUNDSTRAND MACHINE TOOL DIVISION OF SUNDSTRAND CORPORATION

Belvidere, Illinois, U. S. A.

Use postpaid card. Circle No. 232

ported to be fully automatic, to operate without attention and to be virtually free of maintenance expense. It is self-cleaning, and delivers near dry sludge for easy disposal.

The only parts of the separator are a tank, magnaplate, baffle and sludge scraper mechanism. The unit provides for flow rates from 40 to 1,000 gpm.

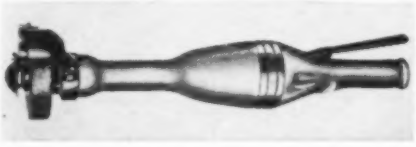
U. S. Hoffman Machinery Corp., Dept. LR, Thompson Road Plant No. 1, Syracuse, N. Y.

Use postpaid card. Circle No. 36

New Line of Portable Pneumatic Grinders

The 902 series in the manufacturer's new line of portable pneumatic grinders will consist of 4" heavy duty horizontal grinders, wire brushing machines, and horizontal buffers.

Grinders and wire brushing machines



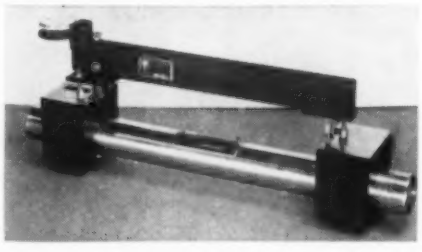
in the series offer a choice of three speeds—12 thousand, 9 thousand, or 7.2 thousand rpm. Straight, lever, or grip-type handles may be specified.

The horizontal buffers, which have a spindle 1" longer than that of the grinders and wire brushing machines, are available in two speeds—12 thousand or 9 thousand rpm. There is also a choice of straight, lever, or grip-type handles.

Thomas C. Wilson, Inc., Long Island City 1, N.Y.

Use postpaid card. Circle No. 37

Adjustable Length Measuring Indicating Gage



A new improved I.D. and O.D. adjustable length measuring indicating gage may be changed from I.D. to O.D. by simply moving the indicator or rest pins to different positions in the gage. Standard units have a maximum measuring depth of 1.000", and a length range from 0" to 54".

Fixed I.D. and O.D. masters are available to set the gage.

Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill.

Use postpaid card. Circle No. 38

In an iceberg or in a J. K. Smit Diamond Tool only a fraction shows above the surface.

Everyone knows about the unseen portion of an arctic iceberg. Many do not realize the unseen factors that lie beneath the surface of a J. K. Smit Diamond Tool, such as . . . our constant research to find still better methods of manufacturing Diamond Tools, the unquestioned integrity of our company since 1888, the manufacturing skills that have been learned and passed on through all those years, and quality control of manufacture for tool duplication.

All these hidden assets count much toward maintaining our position as a leader in the industry today.

When *your* next job specifies a diamond tool for any purpose contact J. K. Smit. Our field representatives are trained and qualified to assist you with any standard or special application.

J. K. SMIT & SONS, INC.
HOME OFFICE AND PLANT
MURRAY HILL NEW JERSEY

Additional plants in London, Paris, Amsterdam and Toronto, Canada

Use postpaid card. Circle No. 233

Electronic Gage Checks Race Curvature of Bearings

Deviations as small as ten-millionths of an inch in the curvature or contour of inner and outer bearing races are said to be detected by this Accutron electronic gage. It can be used also to inspect the radius of other types of precision parts.

Equipped with standard components, the gage checks race curvature of inner and outer bearing rings from ⅜" to 6" outside diameter, ball size from 1/16" to ⅝" diameter. With additional components for miniature bearings, these sizes can be checked: Inner rings with outside diameter from .050" to .500"; outer rings with inside diameter from .075" to .500".

The counterbalanced swing arm with

a frictionless-type Electrojet gage cartridge and pickup stylus mounted to the lower member sweeps the curved surface of the bearing with extremely light but constant pressure.

The Sheffield Corp., Dayton 1, Ohio.

Use postpaid card. Circle No. 39

One Wheel Provides Both Grinding & Finishing

The Bayflex double-duty raised hub disc-wheel for portable grinders features two-layer construction which permits two different grinding angles. Grinding and finishing operations can then be accomplished without stopping to change wheels. When the wheel is held at an angle of 30°-45° to the surface of the work, stock is removed

rapidly. Held at a 10°-20° angle, the second layer produces an excellent finish.

The stock-removal layer is available in a single, standard grit specification while the finishing layer is available in five different grits, each designed for finishing a particular type of metal from heavy steels through light stainless sheets to aluminum and copper.

7" wheels are available in 1/4" or 3/16" thicknesses.

Bay State Abrasive Products Co., Westboro, Mass.

Use postpaid card. Circle No. 40

Tumbling Machines Freeze Rubber Parts Speedily

A series of eight new refrigerated tumbling machines, specifically designed for deflashing and finer finishing of moulded rubber parts, uses

liquid CO_2 as the refrigerant. Most any size or shape of moulded rubber parts may be accommodated.

Freezing the rubber parts with liquid

4 sweet solutions for faster grinding action

For 1¢ a gallon of coolant, you get the most open grinding wheel you'll ever see, with W&B Grinding Concentrate 1500 — unusually keen grinding action. White & Bagley's 1500 is a chemical type water soluble that mixes instantly with water. It forms a light-green, transparent, non-irritating solution that stays sweet and clear. Use it for exceptional accuracy, high production, on *steel and titanium.*

When you want keener grinding action on *steel, cast iron and nonferrous* metals, use W&B Grinding Concentrate E-55. It forms a light-green, transparent solution that retains clarity, — won't irritate skin — eliminates foul odors.

Both E-55 and 1500 (above) give you excellent rust protection, settle chips fast, leave parts and machines clean — they're the best chemical type concentrates you'll find.

To get superior results on *both grinding and cutting,* use W&B Lubricant 1888. This oil-type, water soluble concentrate with high-detergent action mixes easily with any water — forms a stable translucent emulsion that gives more support to wheels and cutting tools. You get smoother finishes, and closer tolerances with White & Bagley's 1888. It's non-irritating, free from offensive odors; keeps machines clean.

If you want to replace oil on tough grinding and cutting jobs, try W&B HD Soluble 2213. It's an all-purpose, extreme-pressure concentrate — fully miscible with water. Gives more support than other water solubles, plus excellent cooling. White & Bagley's 2213 in water produces better results than many cutting oils. It's nonirritating, resistant to odor formation.

To get a sweet solution for any grinding problem — write The White & Bagley Co., 88 Foster St., Worcester, Mass.

W&B INDUSTRIAL LUBRICANTS

THE WHITE & BAGLEY CO.

Worcester, Massachusetts • Detroit, Michigan

Originators of Grinding Lubricants

Use postpaid card. Circle No. 234

CO_2 right in the insulated barrel imparts a metallic hardness to the parts that greatly facilitates the barrel finishing process. Hard trimming of flash and rind from rubber parts is eliminated by this freezing method.

Automatic thermostatic temperature controls provide for temperatures down to 100° F. below zero. A timer indicates by signal light when more CO_2 is needed, while a barrel timer controls the length of the tumbling operation.

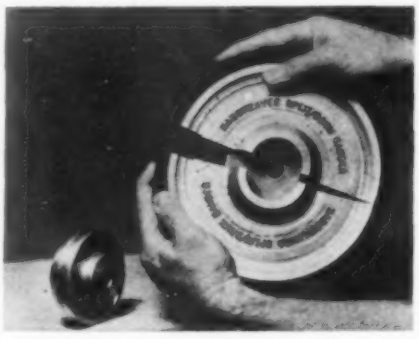
The eight new models range in size from 3.7 to 30.7 cu. ft. barrel capacity. Variable barrel speed is featured, ranging from 10 to 30 rpm.

Almco, Queen Products Div., King-Seeley Corp., Albert Lea, Minn.

Use postpaid card. Circle No. 41

Abrasive Wheels Now Offered In All Sizes Commonly Used

This Split/Drum sander is a cost cutting grinding, buffing, polishing wheel



which will utilize ordinary strips of coated abrasives in place of more costly endless abrasive belts. Prices range from $22.25 upward depending upon diameter and width.

Sizes now run from the new small diameter of 3", then 4", 6", 8", 10" and 12". Most of these diameters are available in widths of 1", 1½", 2", 2½", 3" and 4".

Hargreaves Industrial, 120 N.W. 9th Ave., Portland 9, Ore.

Use postpaid card. Circle No. 42

Water-Soluble Coolant Stops Rust, Rancidity

Cold Stream is reported to stop rust, resist rancidity and reduce the threat of dermatitis. This water-soluble metalworking coolant is said to stay clean for weeks even when used on cast iron. Since the coolant does not hold dirt, the problems inherent in dirty coolants are eliminated.

Finishes were reported as improved by 10 microinches with the use of the product.

S. C. Johnson & Son, Inc., Racine, Wis.

Use postpaid card. Circle No. 43

NEW KIRK & BLUM

Dust & Fume Control CATALOG

52 pages showing 60 different installations in major industries

See how Kirk & Blum engineers the best suited dust and fume control system for each particular application.

See how Kirk & Blum provides one source for the complete operating system—design, fabrication, installation—*one* undivided responsibility.

Clip and send coupon below for your copy.

THE KIRK & BLUM MANUFACTURING CO. 3124 Forrer St., Cincinnati 9, Ohio

Please send me Dust & Fume Control Catalog.

Name_____ Title_____

Firm_____

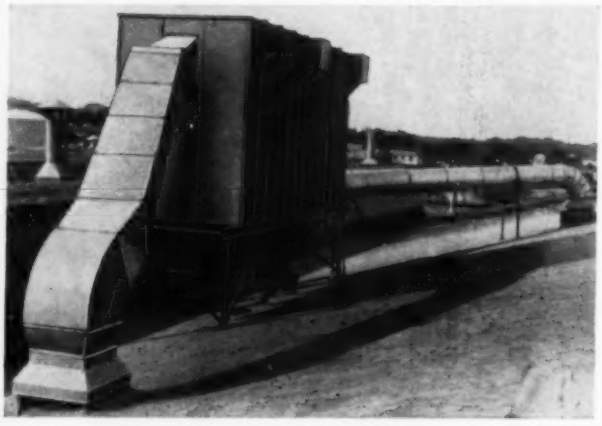
Address_____

City_____ Zone____ State_____

Use postpaid card. Circle No. 235

Dust Control System

The Dustkop Filterkop has been developed for industrial operations where the volume of air to be handled is unusually high. Used with standard vented Dustkops, the Filterkop is reported to receive all the air collected by these units, recovers nearly 100% of the dust load, dissipates harmful fumes, and recirculates air that has been cleaned.



Parts consist of a heavy gauge steel housing, a hopper, 80 cloth filter tubes, and a shaker mechanism.

Depending on requirements, the dust collector and air filter system may consist of a single unit or any multiple thereof. One shaker serves two units. No matter how large the installation, only one air inlet and one air outlet are needed.

Aget Manufacturing Co., Adrian, Mich.

Use postpaid card. Circle No. 44

Wheel Dresser Metal Storage Case

A metal storage case is being offered free with each purchase of a set of Rothfuss' G-5 radius dresser and G-2 angle dresser. Designed to withstand the dangers of a machine shop, the storage case is of strong, durable, lightweight steel.

Rothfuss Tool Co., P.O. Box 202, Elmwood Station, Providence 7, R.I.

Use postpaid card. Circle No. 45

Gun Drill Sharpening Fixture For Gun Drills to 1½" Dia.

Gun drill sharpening fixture, designed for detachable or brazed-on drill heads, offers fast and accurate setup. Points are said to be ground with exact point and relief angles desired. The fixture accommodates gun drills through 1½" diameter.

Point angles ranging from 0° to 45° and relief angles up to 20° may be ground by very simple adjustment.

Each fixture comes complete with four ground locating blocks. Special blocks can be supplied upon request. The fixture can be mounted by magnetic chucking, bolting or clamping.

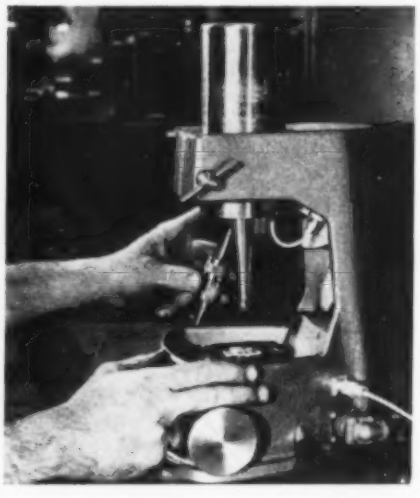
Illustration shows a detachable gun drill head being sharpened on a standard surface grinder.

National Twist Drill and Tool Co., Rochester, Mich.

Use postpaid card. Circle No. 46

Ultrasonic Impact-Drill Has Automatic Tuning, Greater Speed

The Glennite 100 watt impact-drill features an automatic tuning control system. The operator does not need to retune the drill. As the impedance changes, the unit retunes automatically without wasting the operator's time. It is reported to drill faster and larger areas than previous models.



This unit drills, slices, engraves, shapes, taps, broaches, dices, shaves, trepans and machines. Adjustable for the shaping of intricate parts to precision tolerances, applications include ul-

WORKS
like a charm

Clover Coated Abrasives, like any other tools, really do no work at all by themselves; but they have a way of lasting, through use and abuse, that makes many a craftsman think of Clover as a partner.

There are good reasons for this lasting quality. First of all, every Clover Coated Abrasive is made to meet the standard of the best in its class. Second, the Clover line is complete—you can find a Clover Coated Abrasive item that is made for your job.

Ask for the new Clover Catalog to get acquainted with our full line of working-partner abrasives.

Clover Manufacturing Company

Norwalk, Connecticut

Victor 7-4515

Since 1903

Makers of the famous

CLOVER Grinding and Lapping **COMPOUNDS**

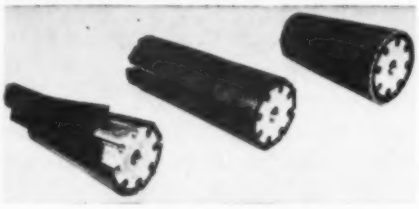
Use postpaid card. Circle No. 236

trasonic machining of such materials as ceramics, glass, silicon, germanium, tungsten, granite, ferrite, tungsten carbide, quartz, precious stones, and aluminum oxide.

Vibro-Ceramics Div., Gulton Industries, Inc., 212 Durham Ave., Metuchen, N.J.

Use postpaid card. Circle No. 47

Expanding-Type Abrasive Cone Eliminates Abrasive Waste



The Flexcone, a new expanding-type abrasive cone, is said to eliminate much of the abrasive waste usually associated with cone-type finishing wheels. Abrasive sleeves stay on the wheel under virtually all grinding conditions and speeds ranging from 2000 sfpm up, according to the company. The cone can be used as a hard mandrel for heavy stock removal or as a soft mandrel for polishing.

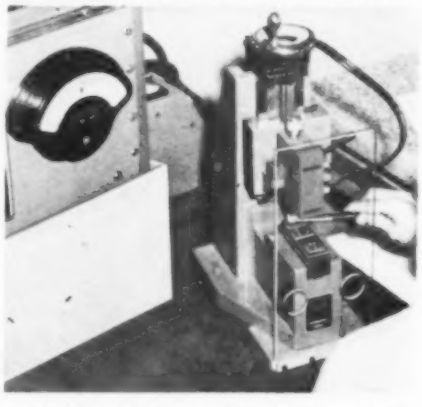
The cone is composed of a machined aluminum core with individual rubber flexers at the periphery. The flexers expand in motion and grip the abrasive so it does not slip or "walk".

The cones are available for 25-day free trial in Model 100, 1¾" x 1" x 3" long, and Model 200, 3" x 2" x 3¾" long, with ⅝-11 arbor hole, or adapter to reduce to ⅜-24 shaft.

Nu-Matic Grinders, Inc., Cleveland, Ohio.

Use postpaid card. Circle No. 48

Gage Block Comparator Detects Variation of .000001"



Model 130 B-12 electronic comparator, capable of detecting dimensional variations of .000001", is said to accurately measure gage blocks as large as 4". Its electronic amplifier provides four magnifications (2000:1, 6000:1, 20,000:1, and 60,000:1). Graduations are .000030", .000010", .000003", and .000001" respectively.

The precision-ground reference platen is fitted with two sets of three balls (one set accommodating square blocks, the other rectangular), which provide an accurate three-point reference surface for comparing gage blocks. The electronic gage head is mounted in V-ways and is supported on a substantial base to eliminate danger of deflection.

Federal Products Corp., 1144 Eddy St., Providence, R.I.

Use postpaid card. Circle No. 49

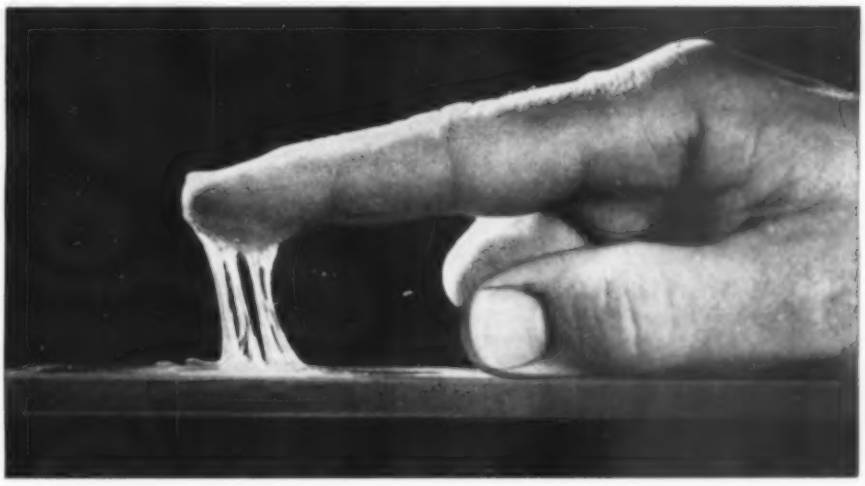
Peening Method Suspends Beads for Even Distribution

A stream of glass beads, microscopic in size and electrostatically suspended in a solution, is being used in a new peening method called Perfecto-Peen. Scale, corrosion, and dirt are stripped away. This method does not remove or alter the dimensions of the basic metal, does not contaminate or leave imbedded particles in the object being peened, and does not nick sharply machined edges or threads, the company claims. Finer finishes up to 4 mu or 1/250,000th of an inch are reported.

The secret of the method is the electrostatic suspension of the spheres in solution to provide uniform impact distribution. The elasticity of the glass beads also prevents damage to sharp machined edges or fine gear teeth, since the beads will assume the contour of the surface, or shatter.

Aero-Test, 1601 Dragon St., Dallas 7, Tex.

Use postpaid card. Circle No. 50



What's glue got to do with the price of finishing?

Stuck? Then you'll be interested to learn that glue is but one of several bonds used to hold the cutting grains to the backing in the manufacture of coated abrasives. Varnishes and resins are also common bonding materials. The problem is to select the proper bonding material to assure maximum belt life. Jewel Brand Abrasive Engineers know, for example, that glue is commonly recommended for dry, low heat applications while resins are usually required where toughness and resistance to water, heat and high working pressures are in demand. Their ability to recommend the proper bonding material often results in substantial savings in time, labor and materials. It will pay you to put their knowledge to work for you. Write for complete details. Abrasive Products, Inc., 517 Pearl Street, South Braintree, Mass.

belts
rolls
sheets
discs
specialties

JEWEL BRAND

COATED ABRASIVES

ABRASIVE PRODUCTS, INC., South Braintree 85, Massachusetts

Use postpaid card. Circle No. 237

Wet Blast Unit Designed for Cleaning Tire Molds

Designed especially for the elimination of hand cleaning in the maintenance of tire molds this wet blast unit was recently delivered to Pirelli, S.p.A., tire molder of Milan, Italy.

Molds to be cleaned are taken directly to the wet blast unit without prior finishing and cleaned to basic metal in approximately 1/3 of the former time required without stock removal. The cleaning medium is a fine mesh abrasive, suspended on water and impelled by compressed air.

The blast cabinet portion, measuring 70" wide x 70" deep x 104" high, accommodates molds 60" in diameter and 8" thick, with a maximum weight of 1½ tons. Manual blasting is conducted by a single operator standing outside the unit using any two of the three armparts, provided the blast gun and window wash controls are foot operated. A large over-rated blower to insure good visibility makes the unit completely self-contained.

Positioned to the left of the blast cabinet is a combination loading device and rinse stand 80" long and 70" wide.

Pressure Blast Mfg. Co., Inc., Manchester, Conn.

Use postpaid card. Circle No. 51

Holder Has Push Button for Magnetic Field Control

Erick Magna-Holder Model 375 features control button which turns on and off the magnetic field. This magnetic base indicator holder comes complete

with all necessary attachments to accommodate all types of dial and test indicators.

A "step" across the top provides for attaching to rounds. The precision adjustment permits "zeroing in" of the indicator by merely turning the adjusting screw. The model is priced at $24.95.

Cullen Mfg. Co., Racine, Wis.

Use postpaid card. Circle No. 52

Multi-Purpose, Non-Acidic Barrel Finishing Compound

Esbec No. 134 neutral, non-abrasive compound, when used with chips or steel media, is reported as ideal for cleaning, light descaling, bleaching or fast burnishing operations. It is highly effective for removing rust or other oxides from steel or alloys, and for bleaching, cleaning or burnishing steel, copper, brass, beryllium copper, and many stainless steels, the firm claims. This compound leaves no soap film after rinsing.

Because the material is non-acidic, subsequent neutralizing is eliminated.

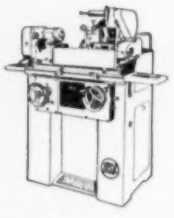
Esbec Barrel Finishing Corp., 190 Henry St., Stamford, Conn.

Use postpaid card. Circle No. 53

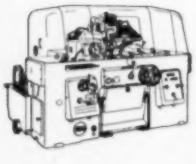
MSO Since 1865 **SOLVES Grinding Problems**

This is the 94th consecutive year of MSO leadership in the development of improved grinding methods.
MSO offers unequalled precision in the most advanced grinding machines available anywhere.
Today, when your grinding problems are more complex than ever before, MSO, as always is one step ahead with the solution.

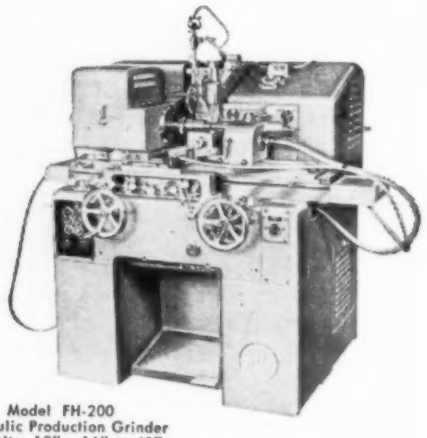
The MSO line comprises a full range of Plain and Universal Grinders, Cap. 7" x 12" to 22" x 138".



MODEL FMES UNIVERSAL GRINDER



MODEL GA-2 HYDRAULIC THREAD GRINDER



Model FH-200
Hydraulic Production Grinder
Capacity: 10" x 16" to 40"

FEATURES:
- Rapid traverse to wheelhead
- Equipped for traverse and plunge-cut grinding
- Selection of 4 automatic cycles with fine finishing feed, adjustable spark-out and automatic cut-out
- Manual and automatic table and wheelhead movement
- Fine feed to .0001" by quick lever trip
- "Precimatic" electric grinding gauge sizes to .0001"

austin industrial corporation
76-G Mamaroneck Avenue White Plains, New York

Use postpaid card. Circle No. 238

Small Gage Block Set Offers Large Set Dimensions

All standard snap ring grooves, O-ring grooves and keyways can now be measured with a small, practical size

set of gage blocks, the company claims, with necessary dimensions provided which were previously possible only with the large and expensive 121 piece sets. It is said to exceed the 81 piece set also. This No. 56-R gage block set claims to provide direct measurement of fractional dimensions down to 1/64", measurement by thousandths from .020", and measurement by tenths from .120".

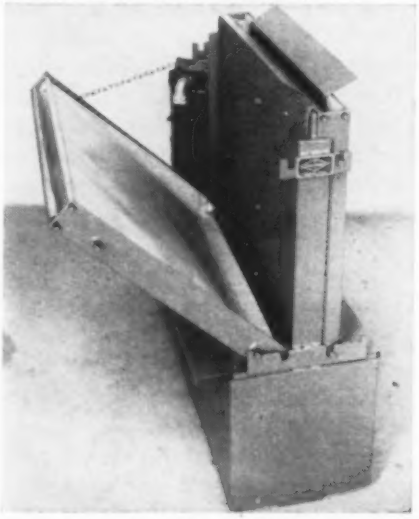
Elimination of intermediate snap gages by direct use of gage blocks provides exact dimensions instead of go and no-go. This eliminates scrap before it starts.

The sets are available in all grades: Grade AA, ± .000002", the highest quality available; Grade A+, + .000004",-.000002", for master sets, calibration and inspection of extreme accuracy; Grade A, +.000006", —.000002", for tool, gage and production inspection; and Shop-Blocks, +.000006", —.000002", for setup inspection and general shop use.

The DoAll Co., Des Plaines, Ill.

Use postpaid card. Circle No. 54

Filtration and Pump Unit Handles Coolant Supply



A compact, self-contained filtration and pump unit is a solution to problems of properly filtered coolant supply as well as an efficient means of recovering chips or grindings of precious and semi-precious metals.

The semi-portable unit is equipped with large-area (850 sq. in., each side) easily-changed, disposable paper filters. The liquid is not forced through the filter media and, as a result, it is said to be able to maintain filtration efficiency in the order of five microns. Filters can be changed while equipment is in operation.

Standard equipment of this model includes heavy-duty centrifugal pump and filter unit having coolant flow capacity through filter of ten gpm water or five gpm oil. The unit is also available with high-pressure pump for deep hole drilling. Tank capacity is ten gallons.

Electroforce Inc., Fairfield, Conn.

Use postpaid card. Circle No. 55

Cup-Type Welding Goggles

A new plastic eyecup is the principal feature of the improved No. 500 cup-type welding goggles. More efficient anti-fog ventilation is also claimed to be an advantage built into the goggles. The one-piece eyecup is strong and easily conforms to facial contours.

A wide choice of lenses and lens shades is offered, including Federal specification grades.

Sellstrom Manufacturing Co., Palatine, Ill.

Use postpaid card. Circle No. 56

Presenting Industry's

BIG SHOW OF SUPER PRECISION SPINDLES

The Complete Line ★ The Diversified Line ★ Job Tested ★ Job Proven

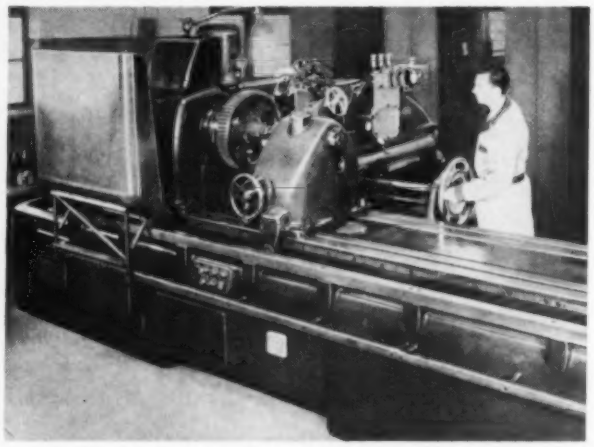
Write Today for our NEW Spindle Catalog

CINCINNATI

The Cincinnati Electrical Tool Co., 314 Mt. Hope Ave., Cincinnati 4, O.

Use postpaid card. Circle No. 239

Gear Tooth Honing Process Applied to 12"-200" Dia. Gears



A new method enables manufacturers of spur and helical gears in the 12" and 200" dia. ranges to economically apply the gear tooth honing process. This process utilizes an abrasive impregnated gear-like tool run in mesh with the work gear at crossed-axes relationship.

As applied to a prototype model, illustrated, the method makes use of separate tool heads and feeding mechanisms that enable one large rotary machine to perform both the gear tooth shaving and the gear tooth honing operations.

Separate heads are utilized since the method used for contacting the tool with the work is basically much different for gear tooth honing than it is for rotary gear shaving. The Red Ring honing method makes use of a patented tilting-table. For large gears, this arrangement takes the form of a hinged tool head that enables controlled light pressure to be applied between the honing tool and the work gear. Rotary gear shaving, being a free-cutting, metalworking stock removal process, requires no such special tool mountings or control of work pressure. Other essential differences between shaving and honing lie in the speeds of tool rotation and cutting fluid requirements.

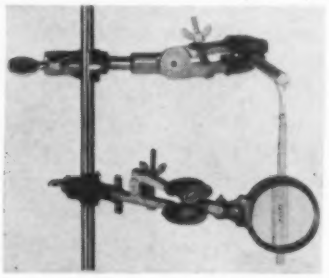
Gears in the 12" to 200" diameter ranges are usually produced in small quantities on equipment requiring large investment.

National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Use postpaid card. Circle No. 57

High Powered Magnifier Has All-Purpose Lab Base

"Precision Vision," designed for science and industry, will improve many procedures in the application of magnification to professional and technical pursuits. It is a new five-power, wide field, non-distorting magnifier equipped with the new Logan universal Lab-Base. This versatile positioning base permits setting the 5X magnifier in any plane or angle for quick, positive focusing.



The magnifier is easily removed from the base. A friction sleeve, attached to the magnifier by means of a swivel clamp, is free to rotate.

In the illustration, the Logan sleeve is shown mounted by clamping into any laboratory or burette clamp.

S. B. Logan & Co., 650 N. Mill St., Genoa City, Wis.

Use postpaid card. Circle No. 58

23-Piece Ultra Thin Gage Block Set

A 23-piece rectangular gage block set, in an ultra thin series made of tungsten carbide, provides the sizes from .010 up to .100 as a supplement to the standard large sets. This proves valuable in measuring tiny screws and fittings. In addition to the .010 series, a similar carbide set is available in the .020 series.

There are nine blocks with .0001 increments from .0101 through .0109; nine blocks, .001 increments from .011 through .019; four blocks, .010 increments from .010 through .040; and one .01005.

The extremely hard and stiff tungsten carbide provides easy wringability over the entire gaging surface.

Fonda Gage Co., Inc., 200 Henry St., Stamford, Conn.

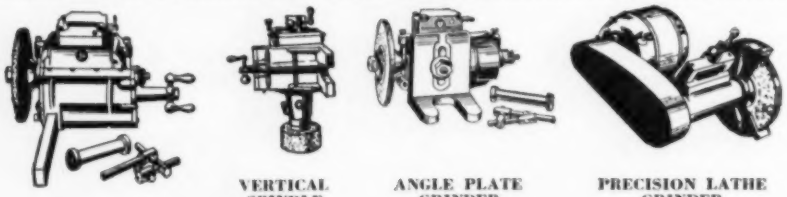
Use postpaid card. Circle No. 59

GRINDING ATTACHMENTS

• *for lathes, planers, boring mills, milling machines, shapers, etc.*

• for FASTER . . . EASIER . . . MORE ECONOMICAL GRINDING

EASILY MOUNTED FOR ALL SUPPLEMENTARY GRINDING



TOOL POST GRINDER

VERTICAL SPINDLE GRINDER

ANGLE PLATE GRINDER

PRECISION LATHE GRINDER

also special Motorized Spindles

For tool rooms and shops handling a wide variety and range of work from the simplest to the most complicated. For internal and external grinding, grinding centers, reamers, taps, dies, rolls, journals, crankshafts, cylindrical, surface or special purpose grinding. With or without horizontal or vertical feeds.

Write for catalogs.

The United States Electrical Tool Co.

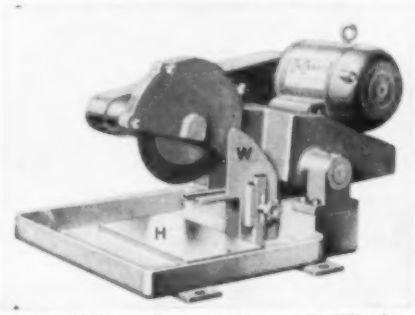
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

Use postpaid card. Circle No. 240

Abrasive Cut-Off Head In Building-Block Design

Abrasive cut-off machines are now furnished to suit the particular operation through a building block program.

The illustration shows the abrasive cut-off head with the splash pan, splash



guard (W) and mounting pad (H) for mounting vise or holding fixture. This head can be furnished with or without the splash pan and mounting pad depending on the user's requirements.

The heads are equipped with either 7½ hp or 10 hp heavy duty motor, and are arranged to use 16" x 3/32" abrasive cut-off wheels.

The Cincinnati Electrical Tool Co., 375 Mt. Hope Ave., Cincinnati 4, Ohio.

Use postpaid card. Circle No. 60

Cyclone Dust Separator Features Adjustable Belt Drive

A new Model 30 cyclone dust separator features an adjustable belt drive that provides a wide range of CFM performance against varying resistances. It includes a new self-cleaning radial blower which delivers high perform-

ance at low horsepower requirement. Top blower speed range is 2790 rpm.

The Model 30-FM is designed for outdoor exhaust. When it is desirable to save heat and recirculate cleaned air indoors, FB models are available.

Measuring 12'10" high, the unit occupies 30" x 36" floor space. The separator includes a magnetic starter and a 10 hp, 3530 rpm, 220-440v/60/3 phase vertical motor. Standard base contains 12½ cu. ft. capacity.

Torit Manufacturing Co., Dept. KP, Walnut & Exchange Sts., St. Paul, Minn.

Use postpaid card. Circle No. 61

Nozzle Aids in Keeping Blast Concentrated

For shot, grit and sand blasting, the Sly Uniflo nozzle is said to retain its original orifice size longer, thereby keeping the blast concentrated to speed cleaning and save compressed air.

The nozzle liner is tungsten carbide, and the jacket is kirksite, a shock-resisting alloy of zinc, aluminum, copper and magnesium.

Orifice sizes are 3/16", ¼", 5/16", ⅜", 7/16" and ½". A ¾" size is also available.

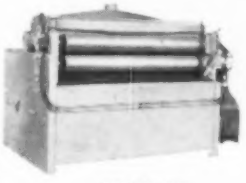
The W. W. Sly Manufacturing Co., Cleveland 1, Ohio.

Use postpaid card. Circle No. 62

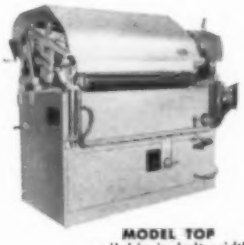
"Only machine capable of handling our rugged and precision sanding requirements on large aluminum panels"*

*Reported by
N. B. Barsha, Plant Engineer
Cupples Products Corp.
St. Louis, Mo.

TIMESAVER SPEEDBELT SANDERS



MODEL SPL
available in belt widths of 24", 36" and 50"
Sanding action is for underside of work.



MODEL TOP
available in belt widths of 24", 36", 50" and 54"
Sanding action is overhead.

"We were faced with the problem of sanding 1000 vertical aluminum panels, 28'x24"x3/16" for the exterior of the new U. S. Air Force Academy buildings. These panels required finishing to a uniform and precision surface specification. Before we purchased the Timesaver Model TOP-50, we thoroughly investigated the market for sanding machines of this type. The Timesaver "Speedbelt" was the only unit which possessed the durability, accuracy and rugged construction necessary for our requirements."

The Cupples Products Corporation's experience is typical of Timesaver "Speedbelt" Installations throughout the country . . . where performance and need to achieve production and cut costs is important. They can do all flat metal surface finishing, polishing and sanding formerly assigned to other methods . . . and do them better. What's more, savings made in labor, materials and maintenance soon pay for their low initial cost.

Investigate the advantages of Timesaver Sanders for your plant, write for literature and information today.

TIMESAVER SANDERS
P.O. Box 7446, Robbinsdale Station • Minneapolis 22, Minn.
Pioneers in Wide Belt Sanding for the Woodworking Industry

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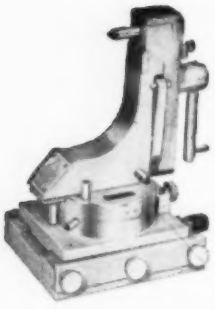
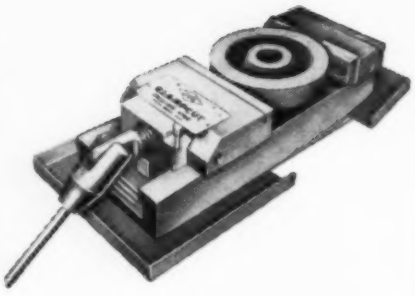
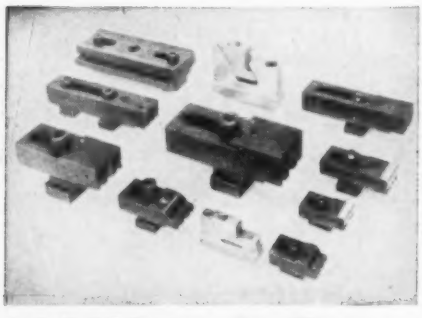
J&S DOWN-HOLDING DEVICES and WHEEL DRESSERS LEAD THE FIELD



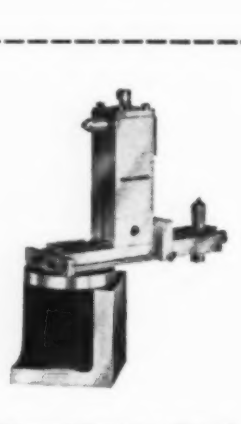
Fluidmotion Wheel Dressers—Dress two angles tangent to a radius, using ONE handle in one continuous motion. Operation is so fast and simple that beginners can use them. For all types cylindrical and surface grinders.



J & S Swivel Vise—The only hardened and ground swivel vise that mounts low, swivels, needs no pedestal. Patented down-holding clamping jaws give many times the holding power of an ordinary vise, yet only half the weight.



J & S All-Purpose Jaw Clamps — For any machine table or face plate. Five models—one adjusting screw has a holding force of 2½ tons on Small model, 12 tons on Jumbo model. Eliminate u-clamps, straps and fingers. No obstruction problems, no interference with measuring tool readings.



J & S Form-Master—Sturdy wheel dresser for shops with less frequent wheel dresser requirements. High quality, 100% dust-proof, it is capable of dressing any radii up to 12″ convex, up to 15″ concave.

Write for free literature and further information.

J & S TOOL CO., INC. | 880 DORSA STREET LIVINGSTON, NEW JERSEY — CLAMPCUT

Use postpaid card. Circle No. 242

Magnetic Angle Block Set

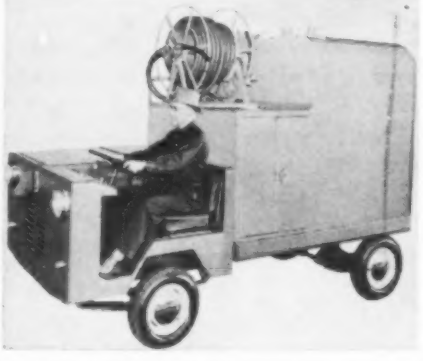
Any angle from 1 to 90 degrees by degrees can be ground with this pin type magnetic angle block set, it is reported. These blocks can be used on any magnetic chuck and turned to any angle from the backrail for compound angles. Only a few seconds are required to set up any angle.

The square steel pins transmit almost all of the magnetism from any magnetic chuck to the surface of the magnetic block which holds the work. These pins will not loosen in grinding use.

Glover Mfg. Co., 422 Park Ave., Meadville, Pa.

Use postpaid card. Circle No. 63

Machine Tool Coolant Servicer



The Gorske coolant servicer, a self-propelled vehicle that services machine tools, transports soluble oils and water, blends to the proper ratio and charges machine tools with the proper amount of blended coolant.

Operator sets the ratio of oil to water on the metering dial. A counter is then set for the quantity of coolant to be delivered. The desired quantity and blend of coolant is mixed and delivered to the machine in two to three minutes.

This is a companion machine to the company's Scavengers which collect sludge and soured coolant from machine tools and sumps.

Gorske Industrial Equipment, 132 E. 30th St., Indianapolis, Ind.

Use postpaid card. Circle No. 64

American Society for Abrasives

Proposed Chicago ASA Chapter

On March 20 **Mr. Leland Pruitt**, member of the National Board of Directors for the American Society of Abrasives, met at the Drake Hotel with all those who were interested in a Chicago ASA Chapter. Approximately 56 future members were in attendance. After Mr. Pruitt's discussion and election of officers, 21 signed applications and paid dues for the proposed chapter.

The officers elected at this meeting were: **Stan Ziegler**, President; **Robert E. Etherton**, Vice-President; **James E. Marck**, Vice-President; **Henry A. Hoppe**, Secretary, and **William J. Reid**, Treasurer. In addition, **Joseph Stiak, Thomas Curtiss, Arthur B. Heina**, and **Kenneth E. Jeppsen** were elected as Directors.

A second meeting was held on April 2 during which the newly-elected officers set up committee meetings. On April 16, the Board again met to review the progress of the committees.

The first scheduled full membership meeting will be Thursday, June 11, at 6 P.M., Nielsen's Restaurant, 7330 W. North Ave., and will include a discussion on diamonds.

All those in the Chicago area interested in attending this meeting are cordially invited. Previous to this meeting, applications may be obtained by writing Mr. R. E. Etherton, Cortland Grinding Wheels Corp., 10336 S. Western Ave., Chicago 43, Ill.

Long Island Chapter

The speaker for the May meeting, held at Wheatley Hills Tavern, Westbury, was James Meehan of the Brown and Sharpe Mfg. Co., Providence, R.I. With B&S since 1917, he is presently the Assistant to the General Sales Manager, Machine Tool Division. Meehan's subject was "Tooling in the Missile Age." He discussed the many problems confronting all industries today and what is in store for us in the near future. The Osborne Mfg. Co. was scheduled to put on the June program with "Modernized Deburring" to be the topic.

Grinding Wheel Safety Subject of Detroit Meeting

The following messages were delivered at the March 26 ASA meeting at Detroit. The first one on "Effect of Speed on Grinding Wheel Safety" was presented by Ralph Merritt, Products Safety Engineer of Norton Co., Worcester, Mass. "Effect of Mounting on Grinding Wheel Safety" was the subject of Fred Upper's talk. He is from the Bonded Abrasive Division of Carborundum Co., Niagara Falls, N.Y. Both messages are considerably deleted, so that we may include the two in this issue.

EFFECT OF SPEED ON GRINDING WHEEL SAFETY

By **Ralph Merritt**

We have chosen tonight to limit ourselves to the principal causes of grinding wheel failure, that is, the speed and the mounting conditions. Without question, these are the two major causes of failure. Of course, speed is always one of the causes of failure of any grinding wheel—if a grinding wheel wouldn't run, it wouldn't break. We estimate that the stretch from the speed will run anywhere from 35% at medium speed 5,000 or 6,000 surface speed a minute up to 75% and greater at a higher speed.

As far as I am concerned this is the first time that we have publicized a factor which is becoming more and more prominent—that is, higher speeds than are generally recommended in the safety code. The highest speed will remove stock faster. In other words, the stock removal will go up above the rate of speed. But, with the conventional machines it has not been safe. Our experimental work has done wonders; and in the last five or six years, we have specialized on snagging speed. We have built a safer, stronger wheel. That has been necessary because we are going to use the higher speed and higher pressure.

The American Standard safety code has maximum speed tables printed. Table 18 touches standard speeds and those are the ones I think most people are generally acquainted with. Basically they limit vitrolite wheels at 6,500 and resinoid wheels at 9,500. Table No. 19 recommends some higher speeds, but they are under very special conditions. The American Standard Code is insistent that the operating speed of the grinding wheels shall never exceed that established by the manufacturer for each wheel.

The 1956 edition of the American Standard safety code for abrasive wheels established certain safe maximum speeds for various wheel classification and specific wheel strength for general grinding operations in table 18. The manufacturer of the grinding wheels, from his knowledge of the strength of the wheel specification involved, must assign a safe maximum speed to each wheel and test it at a higher testing speed as expressed in table 20.

Grinding tests have proven that sometimes higher speed will maintain wheel

corners or shapes as well as remove material at a faster rate. After a long series of testing, it was agreed by wheel and machine manufacturers that certain grinding operations could be performed better at special high speeds. The grinding manufacturers designed and built special machines to assure safe operating conditions and protection.

The code establishes more conditions which must be satisfied to allow approval of these maximum high speeds higher than allowed in table 18. They are as follows:

Condition (a): The machine shall be of suitable design with particular reference to spindle bearing. Machine maker's approval of the higher speed shall be assured and the machine shall be maintained in a satisfactory condition. That basically is the responsibility of the machine manufacturer.

Condition (b): The wheel shall be of adequate strength and shall have been tested by the manufacturer at a suitable over speed and shall bear the wheel manufacturer's approval of the higher speed. That is the responsibility of the wheel manufacturer.

Condition (c): The machine shall be equipped with an approved protection device and, by approved it mentions that those that are specified in the code are limited to 10,000 surface speed. If you go over that, then you have to redesign and test your guard or whatever other protection you have. That is the responsibility of the machine manufacturer and the user of the wheels.

Condition (d): Due consideration shall be given to the operator with particular regard to pressure from side grinding and through the design and shape of the wheel used. And that also is the combined responsibility of the manufacturer of the machine and the operator.

Now we will come to the possibility of the approval for higher speeds which are not contained in either table. Now, of course, there has got to be some machinery setup so that progressive improvement should be allowed and not be hampered by a set code which could have been outmoded. Since your progressive steps in higher grinding wheel speeds to improve grinding operations that reduce grinding cost can safely be approved under these same four conditions, the code explains this. I quote,

"Certain other grinding applications where high special speed may be proven desirable are permissible. If machine conditions, production and operating detail meet the condition a, c, and d, and if wheel involved can be tested and approved for the higher speed of condition b, such special high speed approval is generally treated at the individual specific application and should be confined to the equipment and operation investigated. Under these special speed conditions, it is extremely important that having arrived at the satisfactory machine operating condition, which they do, the user maintains the accepted safe conditions. . . ."

In all fields of grinding we know of operations and research work going on. So I think it is inevitable that higher speed will be used. But in each case, in our opinion (and we intend to enforce our end of it), some similar study and adequate protective recommendations must be made before it can be done. Grinding is not dangerous. There are regulations which cover all factors of it. If they are observed, our excellent record will continue.

(Mr. Upper's talk will be reviewed next month).

No Finer Equipment
FOR
MEASURING FLATNESS
EASIER . . . MORE ACCURATELY

LAPMASTER OPTICAL FLATS

So accurate . . . so easy to get flatness readings down to 1/10 of a light band with the Lapmaster line of Optical Flats. Special manufacturing technique and laboratory control assures uniform flats of highest quality.

Available in certified optical accuracies of .000002" or .000001" . . . in either clear fused quartz or Pyrex glass . . . either double or single surfaced . . . in a full range of standard sizes from 1" through 12" dia.

THE LAPMASTER MONOCHROMATIC LIGHT

There's no easier way to inspect and measure surface flatness. The new Lapmaster Monochromatic Light has a powerful helium lamp (40 candle power) for sharp reading . . . light head is adjustable for best reading angle; can be swung completely around to handle tall parts . . . is easily portable in self-contained carrying case.

Write for complete details and measurement chart.

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In Canada:
Crane Packing Co., Ltd., Hamilton, Ont.

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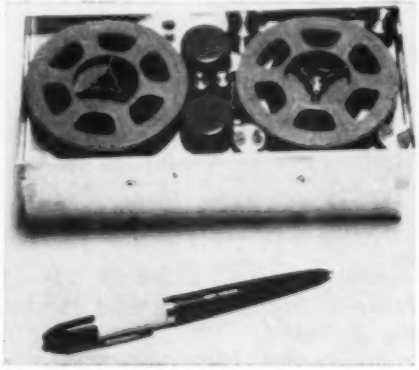
News from the Industry

Miniature Precision Bearings Gives Miniaturization Awards

Miniature Precision Bearings, Inc., of Keene, N. H. recently awarded the 1958 miniaturization award to a five-

lb. atomic generator SNAP-111, which is capable of producing power during its lifetime equivalent to that produced by dry cell batteries 300 times its weight. An engineer at The Martin Co.'s



Nuclear Division in Baltimore is shown testing the radio-isotopic battery.

A three-lb. tape recorder, constructed at home by Stanford University student, Keith O. Johnson, is one of ten entries which won Certificates of Excellence for contributing to the advancement of miniaturization. This four-channel tape recorder is about the size of a kitchen matchbox and functions for about 90 hours from its self-contained batteries.

Split Ballbearing Plant Wins "Top Ten" Award

This is a photograph of an original Kent Day Coes watercolor of the new Split Ballbearing plant at Lebanon, N.H. The plant was named by Factory, the McGraw-Hill publication, as one of the ten top plants constructed during 1958. It was selected from among 700 nationwide entries. Split Ballbearing is a division of Miniature Precision Bearings, Inc., of Keene, N.H.

Aget Installs Dustkop at Air Force Base

An unusually tough government job was undertaken by Aget Mfg. Co. of Adrian, Mich. in licking the dust collecting problem. Illustrated is the woodworking shop at a United States Air Force Base where 21 machines are in almost constant, simultaneous use. Each machine has its own collection hood and pipe. The pipes connect to a large main duct, through which the collected air passes to a model 90N50P Dustkop, just outside the shop. When filled, dump trucks remove the discharged sawdust load.

● ACTUAL MANUFACTURERS OF RESINOID METAL AND VITRIFIED DIAMOND WHEELS UP TO AND INCLUDING 20" DIAMETERS

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NEWS OF INDUSTRY *continued*

Hitchcock's Van Kampen Named as BDSA Reservist

Robert C. Van Kampen, President of Hitchcock Publishing Co., Wheaton, Ill. (Publishers of GRINDING & FINISHING), has been appointed by Lewis L. Strauss, Secretary, U.S. Dept. of Commerce, to the National Defense Executive Reserve, Business and Defense Services Administration.

Van Kampen attended a two-day conference in Washington, May 12-13, when BDSA Reservists were briefed on current defense mobilization plans. The Reserve held a series of regional conferences last year in connection with Operation Alert.

The Reserve extends into approximately 16 Federal agencies, and was authorized by Congress in 1955, at the request of President Eisenhower, to provide skilled manpower for top management and technical positions in a post-attack set up.

AAF Honored for Being "Excellently Managed"

American Air Filter Co., Louisville, Ky., has been honored for its high level of management. The American Institute of Management has certified AAF as "Excellently Managed" during 1958.

The award was made by Jackson Martindell, Chairman of the Board of the non-profit Institute, to "bring deserved recognition to those companies whose managements are doing most to increase productivity, with accompanying benefits to employees, shareholders, their plant communities and the economy as a whole."

Sundstrand Changes Corporate Name

The name of Sundstrand Machine Tool Co., Rockford Ill., was officially changed to Sundstrand Corp. by vote of the shareholders at the company's annual meeting on April 28.

In announcing the change, Bruce F. Olson, President, said, "Sundstrand's nonmachine tool operations have been expanded to a point that the old corporate name no longer accurately reflects the diversification of the company's business. . . ."

Sundstrand Corp. operates five divisions: Sundstrand Aviation, Sundstrand Machine Tool, Sundstrand Hydraulics, Sundstrand-American Broach, and Sundstrand Turbo. A subsidiary, Sundstrand International, handles export sales and service. Foreign affiliates include Sundstrand Hydraulic AB in Sweden and Societe Parisienne de Machines Outils in France.

Black & Decker Forms Subsidiary

The Black & Decker Manufacturing Co., Towson, Md., announces the formation of a subsidiary, Master Power Corp., which has acquired the operations of the Master Pneumatic Tool Co., Inc., of Bedford, Ohio, and Master Pneumatic Tools (Canada), Ltd., of Toronto, Ont., Can. The acquisition has been financed by the issuance of 37,004 shares of the capital stock of Black & Decker.

Operations of the subsidiary will be under direction of **Leonard J. Roll**, Vice-President and General Manager. He was formerly Secretary-Treasurer of the Master Pneumatic Tool Co., Inc. **Harry L. Williamson, Jr.**, former Manager-Special Products Division of Black & Decker, will become General Sales Manager of the new Master organization.

Van Norman Acquires Control of American Pulley Co.

Van Norman Industries, Inc., New York City, announced that it has acquired working control of the American Pulley Co., in which it has held a minority interest for the last three years. Charles F. Myers, Van Norman President and newly-elected President of the American Pulley Co., stated that American Pulley will be continued as a separate company and that no further changes in executive or other personnel are contemplated.

Improved service to West Coast users of precision finishing equipment and processes will be provided by new warehouse and processing laboratory facilities opened in Pasadena, Calif., at 2602 East Foothill Blvd., by **Techline Div., Wheelabrator Corp.**, Vicksburg, Mich.

Wm. N. Lowe Co. of 19055 W. Davison, Detroit, has been appointed by **Nu-Matic Grinders, Inc.** of Cleveland, as Factory Sales Representative in 21 counties in southeastern Michigan. The territory served will include Detroit, Pontiac, Flint, Bay City, Saginaw, Lansing, Jackson, and Adrian.

A. Sunnen Appointed Manager of Sunnen Products Ltd.

A. Sunnen

August Sunnen has been named to succeed his late father, Gus Sunnen, as General Manager of Sunnen Products Ltd. in Chatham, Ont., Can. He is a nephew of Joe Sunnen, founder and President of the Sunnen Products Co. in St. Louis.

Sunnen's business record includes eight years with the St. Louis operation. Since 1947, he has been a Director of Sunnen Products Co. Ltd., Chatham, Ont., and Sunnen Products Co., St. Louis, Mo. He has served three years in the Engineering Dept. of the duPont Co. From 1954 to the present time, Sunnen has been Vice-President of Ramsden Mfg. Ltd., a permanent mold aluminum foundry in London, Ont.

Van Norman Industries Names Hayes Pres. of Morse Unit

J. J. Hayes

John J. Hayes has been elected President of the Morse Twist Drill & Machine Co., New Bedford, Mass., a division of Van Norman Industries, Inc., it was announced by **Charles F. Myers,** President of Van Norman. Hayes succeeds to the position vacated when Myers assumed the Van Norman presidency.

Hayes has been with Van Norman Industries in various supervisory positions for 15 years.

Top U.S. Powder Metallurgist Heads Firth-Sterling Research

J. C. Redmond

John C. Redmond, former Vice-President in charge of Metallurgical Research and Development for Kennametal, Inc., has assumed the post of Director of Research at Firth-Sterling, Inc., Pittsburgh. He succeeds **David F. Dickey,** who resigned to manage a personally-owned business.

Redmond is a veteran Pittsburgh research and development engineer and inventor and is regarded as one of the nation's leading authorities on powder metallurgy.

Frederick Gumm Chemical Co., Kearny, N.J., has appointed **Allied Plating Supplies** as distributor of their Clepo products in the State of Florida. These products for the metal finishing industry will be stocked in Allied's warehouse at 5000 E. 10th St., Hialeah, Fla.

All **Esbec Barrel Finishing Corp.** offices and manufacturing operations have been moved from Byram, Conn. to new and greatly expanded quarters at Old Colony Industrial Park, Bldg. 16, 190 Henry St., Stamford, Conn. All mail for the firm should be addressed to P.O. Box 929, Stamford.

The Esbec Finishing Division and laboratory facilities will remain at 26 Charles St., Meriden.

Formation of the **Sinclair-Brandt Equipment & Supply Co.,** 6620 Dixie Drive, Houston, permits sales in Texas for dust control systems, industrial ovens, blast cleaning equipment and tumbling mills manufactured by **The W. W. Sly Manufacturing Co.,** Cleveland.

In addition to Sly equipment, the firm of manufacturers' agents handles an extensive line of foundry equipment and supplies, furnaces, machine tools and forge equipment.

Another appointment is that of the **Devlin Brothers,** 1003 Maritime Bldg., New Orleans, La., to be the Sly firm's Louisiana representative. Devlin Brothers also handles an extensive line of gas-burning equipment, boilers, air moving equipment, and duct work.

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SUPPORT BLADES FOR
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FROM STOCK standards & specials
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Tube & Rod • Roller In-Feed
Race • Power Race
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for special application
Willey's have pioneered in the development and manufacture of carbide work support blades. Seasoned toolmakers with "know-how" build these tools for standard as well as for special applications. Many centerless grinding operations require special carbide tipped work support blades for work such as: multi-diameter—angular—form—tapered or radius grinding.
Write for complete illustrated catalog and price list
RECONDITIONING SERVICE
Willey's regrind or carbide re-tip your worn out, chipped, broken or damaged work support blades to original accuracy . . . smooth—straight and parallel. For more than 20 years Willey's customers have used this service, often having the same blade reconditioned many times . . . a service and savings available to you too
WILLEY'S
CARBIDE TOOL
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1340 WEST VERNOR HIGHWAY • DETROIT 1, MICHIGAN
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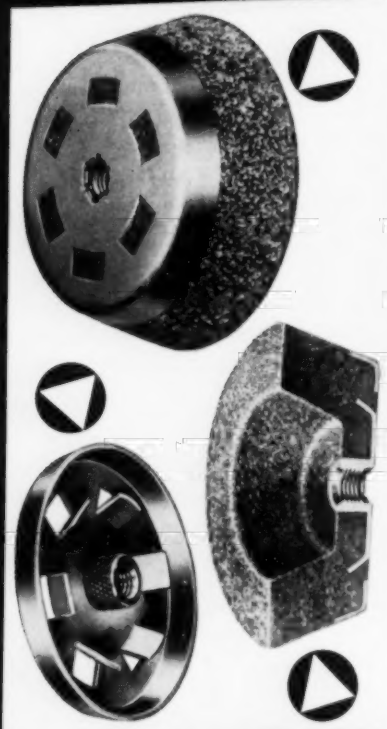

DO YOU WANT BUILT-IN SAFETY IN YOUR WHEELS?

OVER 15 GRINDING WHEEL MANUFACTURERS ARE NOW PROVIDING CARROLL'S SAFETY-GUARD INSERTS IN THEIR WHEELS

- This new Safety-Guard Insert with its integrated, revolving guard gives you built-in top performance and test results show the safety factor is increased up to 75%.
- The Carroll Safety-Guard Insert meets all requirements of a cup wheel guard as specified by the ASA Safety Code.
- Specify, order and try this Carroll Safety-Guard Insert on your snagging wheels and be convinced yourself of its safety-first performance.

Insist on safety-first with Carroll Safety-Guard Insert.

CPM INC *Write for Information on Carroll's Safety Guard Insert*

CARROLL
PRESSED METAL, INC.
133 DEWEY ST.
WORCESTER 10, MASS.

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Trophy recipients for outstanding sales accomplishments in 1958 were photographed at Armour Alliance Industries Coated Abrasives Division sales conference at Alliance, Ohio. Front row, left to right: George D. MacMillan, Baltimore; Marvin O. Carr, Sales Supervisor, West Virginia; William T. Loeck, Pacific Coast Division Sales Manager; Back row, Myron L. Svare, Supervisor in New Hampshire, and Thomas P. Mannion, New York.

M. F. Filiatraut, until recently an Assistant Production Superintendent of the machine and sheet metal shops at Baker Perkins Inc., Saginaw, Mich., has been appointed Production Superintendent. He succeeds **Jack Price,** who retired April 1, after 40 years' service with the company.

Filiatraut came to the firm from General Motors' Central Foundry Division in 1937. His new responsibilities with Baker Perkins include supervision of the company's machine shop, machinery assembly and plate shops, sheet metal and equipment assembly, electrical production, tool room, pattern shop and materials handling.

Hanson-Van Winkle-Munning Co., Matawan, N.J., has appointed **Perry C. Burnham** to the post of District Manager, J. C. Miller District, Grand Rapids. His new territory includes western Mich., the state of Ind., and northern Ohio (except Toledo).

Burnham has been associated with H-VW-M since its merger with the J. C. Miller Co. in 1954. Following the merger, Burnham, a metalfinishing engineer, specialized in sales and engineering for H-VW-M's line of full automatic processing conveyors. He joined J. C. Miller in 1948.

James A. Badaluco remains as Vice-President and will continue to specialize in compound and buff sales nationally. His headquarters will remain in Grand Rapids, while **Walter R. Lockwood,** Sales Representative, will continue to maintain his office in Anderson, Ind.

Ralph E. Price has been elected Executive Vice-President and Assistant General Manager, Landis Tool Co., Waynesboro, Pa. He has been General Manager of the company's wholly owned subsidiary, Gardner Machine Co., Beloit, Wis., and most recently Vice-President of Landis.

Also elected were **Eugene R. Fogt,** Assistant Treasurer; **Daniel H. Ruth,** Sales Promotion and Advertising Manager, and **William P. Flohr,** Chief Engineer.

Several changes in management personnel have taken place at Federated Metals Division of American Smelting and Refining Co., New York City.

L. D. Alpert, General Manager of the Eastern Dept. of Federated, has been named General Manager of the Division's Whiting, Ind., plant, replacing **S. A. Glueck,** who has resigned. **P. H. Jackson,** Vice-President and General Manager of Federated Metals Canada, Ltd., will succeed Alpert as General Manager of the Eastern Dept. **G. F. Norman,** Manager of Federated Canada's Montreal plant, will replace Jackson, and **H. Trihey,** who has been the plant's Sales Manager, will move up to the job vacated by Norman.

Roger W. Cowles, Jr. of Northboro, Mass., has been named as New England representative for the Whiton Chuck Division of the Whiton Machine Co., New London, Conn. His territory will include Me., N.H., Vt., R.I., Mass., and Conn.

G. R. Blake

P. B. Marshall

W. H. Cheney

W. S. Hallowell

Gilbert R. Blake has been appointed Product Safety Engineer of Norton Co., Worcester, Mass., succeeding **Ralph N.S. Merritt** who has retired after a Norton career of 36 years. **Roy T. H. Wiffin** will assist Blake.

Peter B. Marshall is now Supervisor of Sales Training for Norton, succeeding **Robert W. Cornish** who retired after 43 years in sales and sales training work with the company. **Wendell H. Cheney** has been named Supervisor of Recruiting, in which post he succeeds Marshall.

Norton Co. has also appointed two new Abrasive Engineers in its field sales organization: **Richard B. Hardy**, formerly Field Engineer at the Philadelphia district office, is now an Abrasive Engineer for the metropolitan Philadelphia area, and **Stephen W. Anderson**, who recently completed the sales training course, is now an Abrasive Engineer for Wis., Minn. and N. Dak.

Four new agents have been appointed by the Techline Division, Wheelabrator Corp., Vicksburg, Mich.:

Lester R. Albert, Jr., owner of Carol Machine Tool Co., Ramsey, N.J., will represent Techline in the metropolitan New York area and in northern New Jersey; **The Bauer Co.**, Ft. Worth, Tex., will cover the state of Texas; **Gene A. Castle's** territory is northern Indiana and northwest Ohio, and **Robert H. Tiers**, Pres. of Torrington Chemical & Supply Co., Torrington, Conn., will represent Techline in the states of Me., N.H., Vt., Mass., Conn., and R.I.

William S. Hallowell has been appointed as an Abrasive Engineer for the Sterling Grinding Wheel Co. of Tiffin, Ohio. He will take over the Indiana area. Hallowell's background includes 20 years in the abrasive industry, and for the last two years he has represented Sterling in the San Francisco area.

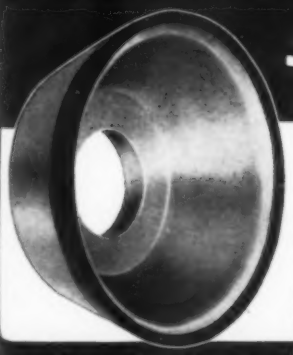
P. A. Mongerson

W. D. Gwin

Simultaneous promotions of **Paul A. Mongerson** to Vice-President and **W. Dean Gwin** to Factory Manager have been announced by The Chicago Screw Co., Division of Standard Screw Co., Bellwood, Ill.

Gwin, who succeeds Mongerson as Factory Manager, now assumes responsibility for all plant operations and will report to the new Vice-President. Mongerson, in addition to these duties, will also assist **President W. D. Corlett** in the general management of the firm.

DIAMOND GRINDING WHEELS



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3¾" diam. x 1/16" diam. sec. 100 concen.
Reg. Price $137.51 SALE Price $110.01

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GUARANTEED — 72 CARATS of diamond to the cubic inch in the diamond section

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Whether you use single or multi-stone settings . . . in unipoint, spade-type or profile dressers . . . you'll find PRESTALLOY offers you a complete, immediate selection of clean-cutting, long wearing tools. And only PRESTALLOY gives you the established advantages of "Pressure-Set" mounting . . . an exclusive diamond-anchoring method that insures maximum dressing speed and efficiency! In addition to the regular PRESTALLOY line (a few of which are shown below), our flexible production facilities enable us to quickly produce for you non-standard and special wheel dressing tools to meet your exact specifications. Let us quote on your requirements.

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Controls Tailor Made . . . from stock

Develop the control system you *require from components that are available from* stock!

This new system of machine tool control is now possible with *MICROtrol* *160, which offers 54 standard gaging and control components that can be combined to achieve any stage of automation in . . .

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MICROtrol 160 elements control the production cycle automatically. They inspect each piece, sort out rejects and tell the operator *when* and *how much correction* is required. Simple to install, and completely flexible, *MICROtrol* systems can be adapted to your production operation all at once . . . or in stages.

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The *MICROtrol* System will improve your plant's production capability. One of our field engineers will survey your operation, tell you which *MICROtrol* elements you need.

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A DIVISION OF CUTLER-HAMMER, INC.

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A. C. Moore

K. A. Henn

W. R. Ebling

B. H. Wildenhaus

Kenneth A. Henn has assumed the newly-created position of Domestic Sales Manager of Jones & Lamson Machine Co., Springfield, Vt. He will direct the activities of all district offices, and all domestic and Canadian agents. Formerly Manager of the company's Detroit office, he will be succeeded in that post by **Lewis Bernardini.**

Richard C. Hayes has been appointed Sales Engineering Representative in the Chicago area for the Bendix Filter Div., Bendix Aviation Corp., Madison Heights, Mich. He will provide sales and application engineering assistance to users of high-performance filters in the aircraft, missile, automotive, agricultural and industrial machinery industries in Chicago, Milwaukee, Minneapolis, St. Louis, Moline, Rock Island, and Rockford.

Hayes possesses extensive application engineering and sales experience gained with companies such as Cuno Engineering Co., Skinner Chuck Co., and Firestone Tire and Rubber Co.

T. C. Tiearney has been appointed Assistant Sales Manager of Indiana Commercial Filters Corp., Lebanon, Ind. In 1950, he joined the Honan-Crane Co. which was later acquired by Commercial Filters Corp. During this period, he served in a sales engineering capacity on the complete line of CFC filtration equipment.

Joseph A. Rzezutko, formerly the company's master mechanic, is now Production Manager for the Detroit plant of the American Metal Products Co. He joined AMP in 1946 following experience as an engineering consultant and moved into the company's revitalized aircraft program.

Arthur Buck, with the firm since 1942, has become Master Mechanic. **Robert Schueler,** formerly Assistant to Buck, has been named Chief of the Cost Estimating Dept.

Walter R. Ebling has been appointed Market and Product Analyst of the Metallurgical Products Dept., General Electric Co., Detroit. A graduate of the University of Wisconsin with a master's degree in business administration, he recently completed a series of assignments covering the General Electric Co.'s marketing training program.

B. H. Wildenhaus has been appointed Manager of Distributor Sales, announced **T. E. Douglass,** Sales Manager of grinding wheel products, Simonds Worden White Co., Dayton, Ohio. In this newly-established position, Wildenhaus will form and be responsible for a nation-wide distributor organization for the sale of Simonds Worden White grinding wheel products.

Since joining the firm in 1927, Wildenhaus has served in various supervisory capacities in both the Grinding Wheel and Machine Knife Divisions. For the past 19 years he has been District Manager for the Grinding Wheel Division in the Ohio and Indiana territory.

Allen C. Moore has joined the Cleveland sales organization of Bay State Abrasive Products Co., Cleveland. He has been associated with the abrasive industry since 1951, and was last employed as Manager of Abrasive Sales for Pattison Supply Co., Cleveland.

James W. Ethington and **Howard H. Monk** were elected Directors of Sundstrand Corp., Rockford, Ill. The two were named to succeed two retiring Directors, **Gust H. Ekstrom** and **Harry B. Newton.**

Ethington is Treasurer and Controller of Sundstrand Corp. He joined the company in 1939. He was made Controller in 1955 and in 1957 was also named Treasurer. Monk is President of Howard H. Monk & Associates, Inc., Rockford, Ill., advertising agency.

W. Jehu

C. C. Haynie

Walter Jehu has been named Managing Director of Australian Timken Proprietary Limited. He replaces **Elmer Schweitzer** who died recently following a brief illness. Jehu has been with the Timken Co. of Canton, Ohio, since 1929. In 1957 he went to Australia as Director of Sales for Australian Timken.

Cyrus C. Haynie has been named Assistant to the Plant Manager at Solar Aircraft Co.'s San Diego plant. Haynie, who has over 20 years experience in aircraft manufacturing and engineering, will carry out special assignments for the Plant Manager. Before joining Solar, he was Manager of the Aircraft Components Division, Ferrotherm Co., Cleveland.

R. C. Byran

A. C. Schliewen

Richard C. Bryan has been named Manager of Manufacturing and **A. C. Schliewen** Works Manager of The White Motor Co., Cleveland.

Bryan, who has been with White for 11 years, will be in charge of all detailed manufacturing, including purchasing, quality control, material control, truck and machining divisions. Schliewen, who joined the firm in March, 1956, has been in automotive manufacturing since 1933. He will be responsible for machining and truck assembly.

Dr. Siegfried Lindena has been appointed Director of Advanced Research for the Special Products Division of Networks Electronic Corp., of Van Nuys, Calif. Before coming to Networks he was Chief Engineer of the Stablvolt Division of Magnetic Research Corp. and also was Group Chief of the Power Supply Section.

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Do you know what SIA means? SIA is not only leading in propaganda, SIA is the brand for Swiss quality abrasive products. SIA has always concentrated on producing the highest quality coated abrasives, with the result that today the name of SIA is respected all over the world. Ask for prices!

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US Agent
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SIA

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Full 1/3 h.p. G. E. Motor

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complete with cord, plug, switch ready to use $89.95

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V-B Liquid Honing*

Your Way to Say:
"MOST MODERN PRODUCTION BLASTING EVER DEVELOPED!"

This Machine Should be Processing Your Parts

Metals, plastics, ceramics — any materials you use — can be Liquid Honed fast and to close tolerance. Send a sample scale-covered part with a letter describing your problem. Liquid Honing engineers will remove the scale and return the part with their recommendations. No cost to you...no obligation.

DOLLAR FOR DOLLAR, JOB FOR JOB, NO OTHER SURFACE-CONDITIONING METHOD CAN EQUAL LIQUID HONING.

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removes heat treat scale fast

blends out grind lines and produces smooth, non-directional surface for good oil flow.

. . . clears away mill scale, rust, welding and heat discolorations.

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New, Lightweight, Powerful

FLEXIBLE TOOL SHAFT

Connects To Any Motor

Stow flexible tool shafts increase precision, eliminate operator fatigue on production grinding, polishing, sanding and other finishing operations in which the operator must hold the tool for long periods of time. Up to 3 HP can be transmitted through these new tool shafts, which consist of a core made of highest grade music wire rotating inside a rubber-covered casing. Each shaft furnished with ball bearing motor connection and high-speed ball bearing handpiece with removable wheel Arbor having ½-20" threads. An angle head can be used in place of the handpiece as shown in the photograph.

Four Sizes of these shafts are available . . . models 38, 40, 50 and 63, which come in 6-foot standard lengths. The largest shaft, model 63, will handle 3 HP at speeds up to 6900 RPM and has a maximum capacity for various accessories as follows: grinding wheel, 8" x 1"; buffing wheel, 8" x 1"; sanding disc, 9" diameter; sanding drum, 6" x 2½"; wire brush, 8" x 2"; steel drills, ½" diameter.

Write for Catalog 59

STOW MANUFACTURING CO.

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IMPORTANT NEW SHAPE IN WHEEL DRESSING

Johnston Huntington

- Safe, comfortable Handle
- 6 Sets of Bearings
- Extra High Carbon Milled Cutter Teeth

Ask your distributor, or write direct for "Dresser Guide" and prices . . .

MACHINE PRODUCTS CORP.

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NEWS OF INDUSTRY *continued*

F. L. Chapman

Fred L. Chapman, Vice-President in Charge of Sales at Gisholt Machine Co., Madison, Wis., and a member of its Board of Directors, is now retiring after thirty years of service to the company.

Harvey A. Waddell, who had been Treasurer of the firm since 1952, has now been elected Secretary and made a member of the Board of Directors. He came to Gisholt 32 years ago and was first employed as a booth clerk in the shop.

H. A. Waddell

Vernon L. Loofboro has been appointed Executive Vice-President of Gardner Machine Co., Beloit, Wis. He was formerly General Manager and previous to that was Manager of the Abrasive Division of Gardner.

V. L. Loofboro

Harold R. Boyer has been named to the newly created position of Director of Military Products for General Motors Corp., Detroit. He will be on the staff of **S. E. Skinner,** Group Vice-President in charge of Accessory Division. Boyer has been Manager of the Cadillac Motor Car Division's tank plant at Cleveland since 1952.

Reprints Available

Better Diamond Dressing for Precision Grinding
Effects of Materials on Snagging Wheel Performance
Flap-Type Coated Abrasive Wheels
How Good Are Man-Made Diamonds?
When and How You Can Use Crush Form Grinding
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For creative low cost product finishing — let ABRADO'S completely equipped laboratory help you find the answer.
Send samples for Free Demonstration

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BOOTH 34	Barrel Finishing Equipment — Abrasive Media & Compounds. Write for Data Sheets and Price List. GF-10.	SEE US 5th INDUSTRIAL FINISHING EXPOSITION

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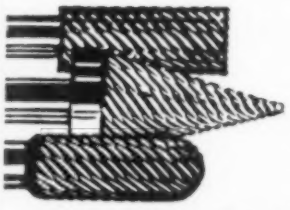

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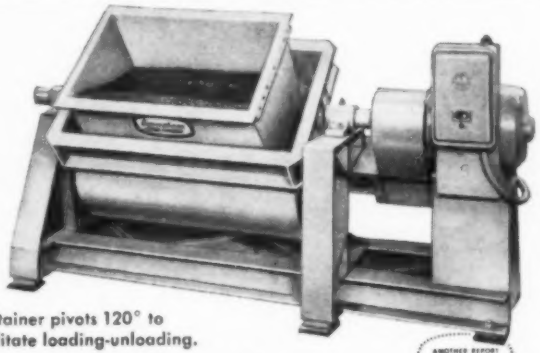

Container pivots 120° to facilitate loading-unloading.

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This amazing metal finishing machine vibrates a full 5 cu. ft. load* of parts and media . . . uses scrubbing action to remove burrs and finish parts in a fraction of the time required in ordinary barrel finishing operations.

The new *Vibrasheen* Method is particularly suited for faster burr removal from parts, and finishing hard-to-reach internal crevices. Can be used for deburring, descaling, cleaning, burnishing and surface refinement.

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** Smaller and larger models also available.*

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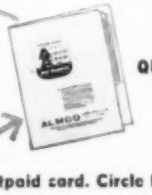
NEW PRODUCT ALBUM
Gives full information on new Almco Supersheen Systems. Describes new and better machines, methods and media. Write today!



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King-Seeley Corporation
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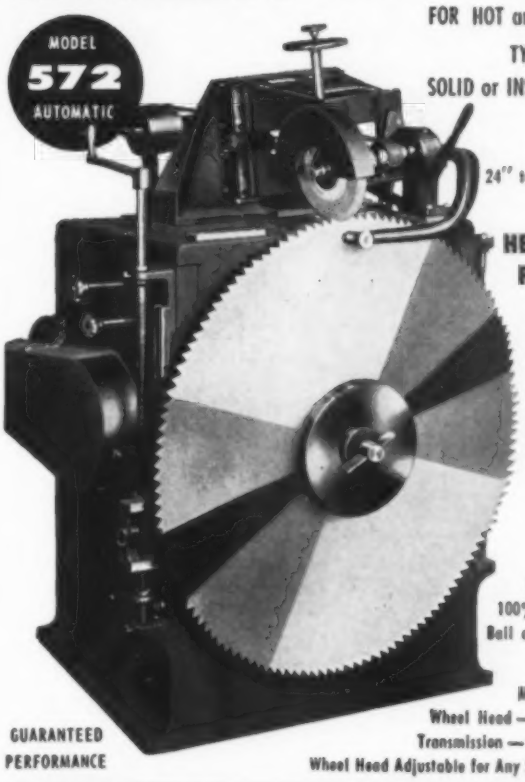
FOR HOT and COLD SAWS
TYPES
SOLID or INSERTED TOOTH

MODEL 572 AUTOMATIC



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No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.

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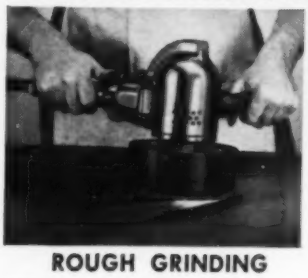

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Model 500-V pneumatic sander (above, at right) is perfectly balanced for feather-edge accuracy in fine metal finishing. Takes 7" sanding disc. 3 models with 2300, 3000 and 4000 rpm speeds.

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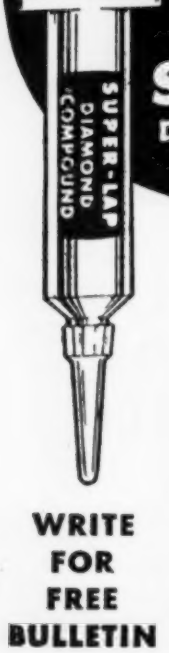
THROW-AWAY APPLICATOR FOR ACME SUPER-LAP DIAMOND COMPOUND



More brilliant micro finishes are achieved with Super-Lap...

- Diamond is pure—assuring faster cutting
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All orders for diamond compound now supplied in a free plastic throw-away applicator, in 5 gram and 18 gram sizes. Each applicator is color coded with grade shown; an air seal cap is provided for protection when not in use.

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Its versatile application and high precision performance allow Grind-A-Matic to perform grinding operations normally done on an expensive jig grinder. Mounted the same as any standard tool, it becomes a close tolerance grinder for such work as internal grinding of tools, dies and fixtures.

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GRIND-A-MATIC

provides jig grinder performance at drill press prices

- *Fine radial adjustment from "0" to .070" while the spindle is rotating.*
- *Uninterrupted precision grinding*
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- *Adapted to include holes up to 5½"*
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GRINDING and FINISHING

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Grinding the 120" Lick Observatory Mirror

A first-hand report on the techniques and problems of grinding a four-ton slab of glass to an accuracy of .000002".

Vibration—New Angle on Loose-Grain Finishing

Faster processing, finishing of areas inaccessible by other means and savings on media and compound are claimed for this new process.

Closed Filter System, Coolant Betters Knife Grinding

Substituting a self-contained filtering system and a proper coolant for creek water improved knife grinding operations at a New York company. Special case report.

A GUARANTEE FOR YOUR CRYSTAL LAKE GRINDER

When purchasing a REX SUPERVAN HIGH SPEED STEEL SPINDLE for your Crystal Lake Grinder an additional $50.00 to the purchase price will give you a TWO YEAR SPINDLE GUARANTEE.

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A CRYSTAL LAKE GRINDER will hold size as well as grind round from .000005 to .000020" and finish from One to Four Microinch SURFACE FINISH. The essentials in grinding are a round spindle, taper bearings, a spindle that can be adjusted periodically without the squashing of bronze boxes and to have belt pressure ninety degrees from grinding pressure so the bronze boxes will not wear out of round.

For example, fuel injectors, after having been rough ground, can be ground to .000010" roundness with a sixty grit wheel and one pass of the wheel.

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A Final Thought

EVERYONE NEEDS RESEARCH

Many medium-sized companies shiver when research is mentioned. The subject is too vast for them, conjuring up visions of hundreds of scientists experimenting patiently with test tubes and expensive equipment developing cellophane, Dacron, solid fuels, new super alloys and weird mathematical formulae. "We're small companies," they say, "that sort of thing is too costly and too involved." This is only partly true, no medium-sized company is expected to invent perpetual motion or develop research projects leading to eternal life. But does this mean they should not engage in some form of research?

Three major obstacles block the research activities of medium-sized companies: 1. A natural reluctance to spend money; 2. Not knowing what to research; 3. The cost of research.

Some companies are reluctant to spend money for anything, new equipment, new methods, top grade personnel or research. Their answer is that research is not measurable and is a dignified form of gambling. They further apologize for their stand by saying their business is not one which needs new products. They prefer to let others do it and benefit without spending their money. While some manufacturing companies have a legitimate excuse here, others are merely parasites, and a few are even dishonest enough to appropriate the results of others. However this may be, it is closely allied to the fact that many companies are not sure of what they should research.

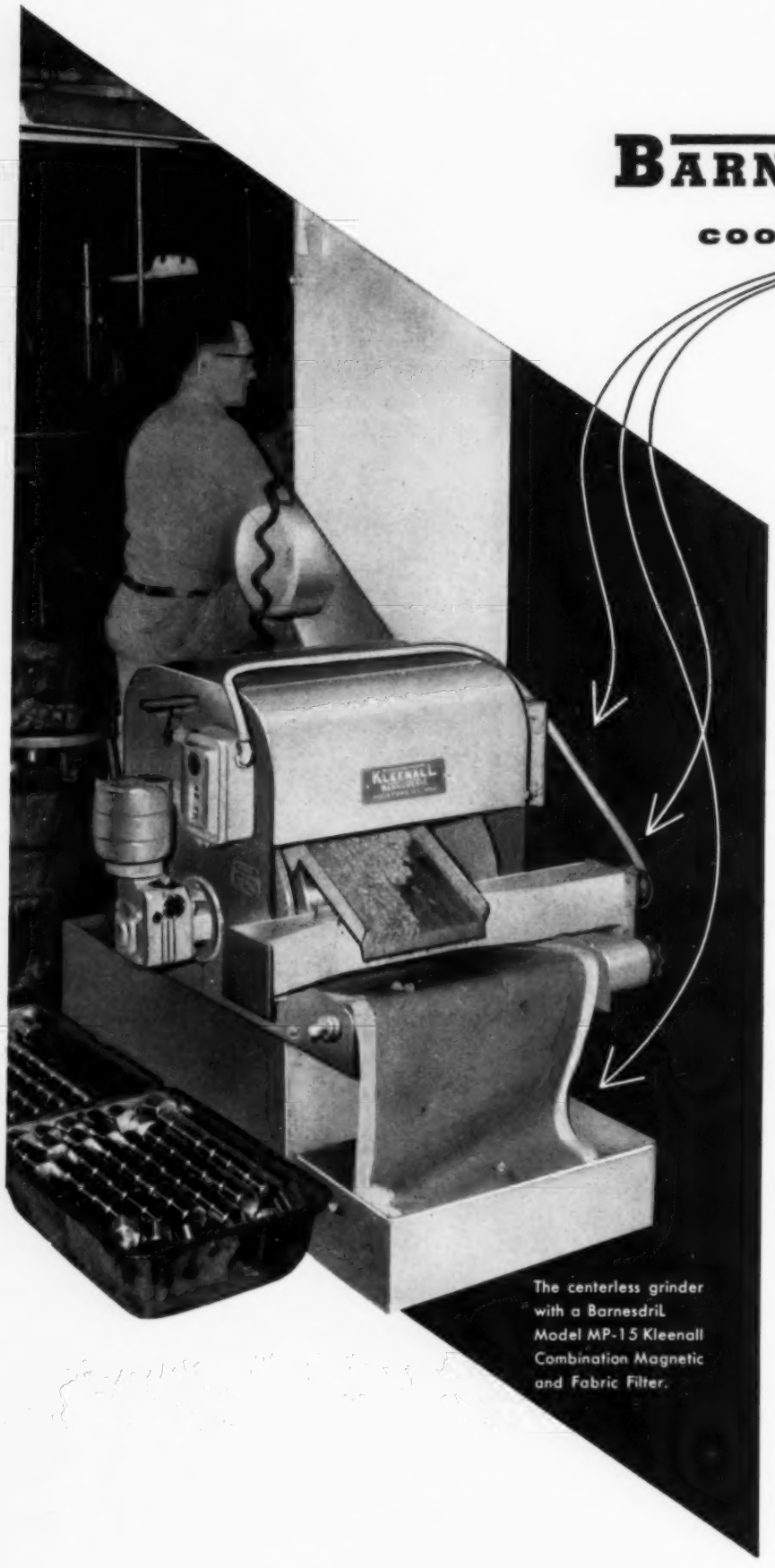
Research, like a woman, wears many faces. You may want your research to develop a better, or a newer product. You may want to discover basic, underlying truths which will help your customer use your product to better advantage. Let us say this research is outward-directed. Research can also begin at home, or be inward-directed, i.e. research into methods of manufacturing, or into the field of value analysis. You can research into metal removal operations to determine whether your processes are the most economical which can be found. What about market, sales, merchandising research, to enable you to sell more and better and discover new uses for your products. The list is endless.

And finally, the cost. This is often much less than anticipated. The major cities have many contract research organizations who work on a slight profit margin and who can frequently supply contract research work cheaper than you can do it inplant. Their fees are generally paid a hundred times over by their benefits to you. Remember, you don't have to undertake vast multi-million dollar projects.

Economically and technologically the world is catching up, and in many instances, has already surpassed the U.S. While improved technology, spurred on by research, is certainly not the only answer to our mounting problems, it is important in this respect: let us not lose out because the other fellow has a better product which we were too lazy or too stingy to develop. This we can avoid, and should. Research is an important weapon in the struggle for markets and customers. Use it, but do so wisely.

Wm. J. Schleicher

Vice President & Editorial Director



The centerless grinder with a BarnesdriL Model MP-15 Kleenall Combination Magnetic and Fabric Filter.

BARNESDRIL

coolant filters

provide competitive quality advantage

"Savings are secondary to the quality control we have gained in the use of BarnesdriL Kleenall Filters. The Filters have allowed us to keep ahead of our competition in the quality of our product."

This statement was made by the plant superintendent of a prominent roller bearing manufacturer. A centerless grinder (shown) and a super finisher are used for surface finishing and bringing bearings to their final accuracies. Both are equipped with BarnesdriL Kleenall Combination Magnetic and Fabric Coolant Filters. The bearings, used in guided missiles, aviation electrical motors, and transportation equipment, are finished to 2 to 3 RMS micro-inches. Size must be held to ±.000025", and their crowns held to .00001", checked by electronic measuring device.

By filtering the recirculated coolant through Kleenall Filters, definite production savings are also accrued. Less coolant and less labor are required and equipment lasts longer. If quality control or extreme accuracies are part of your production requirements, consult a BarnesdriL Engineer about the advantages of Kleenall Filters.

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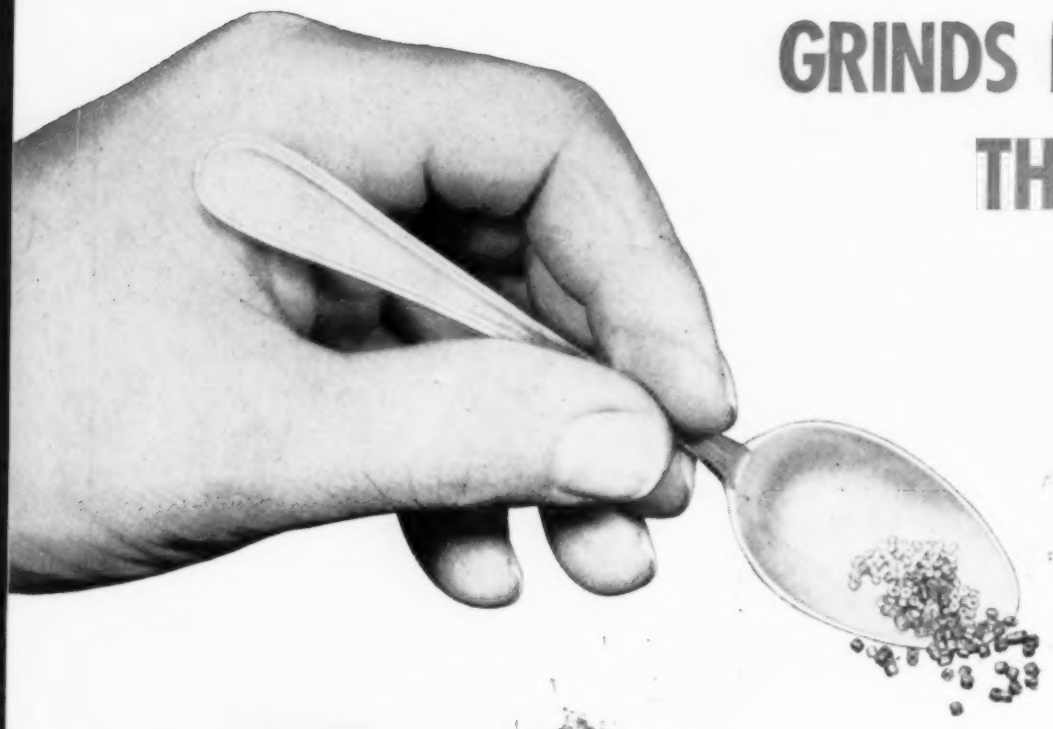

NEW HEALD DEVELOPMENT awarded Certificate of Excellence in 1958 MINIATURIZATION AWARD for unique, systems-engineered design

THIS AWARD, the first ever made to a machine tool manufacturer, cited the Model 090 for the following contributions to miniaturization.

"The Heald Model 090 Centerless Internal Grinding Machine is considered to be a radically new development, system-engineered specifically for improved production of miniature ball bearings. Whereas previous equipment had been modified to adapt it to miniature work, the Model 090 was completely designed for this purpose alone, with all components working at optimum efficiency. With this machine, inner races as small as .040" I.D. can be ground to .00015" size tolerance and 5 microinch finish in a fully automated 15-second cycle. Major advances in design include shoe-type centerless workholding with rotation from both front and rear faces — specially-designed super-speed wheelheads — hydrostatic anti-friction feeding cross slide with ultra-sensitive electronic control — and sensitized method for automatically maintaining precise wheel-to-diamond relationship and compensating for drift."

Whether you grind miniature parts or not, this development is a significant example of Heald's ability to solve tough precision-finishing problems. Your Heald engineer will welcome *your* problems, too.

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